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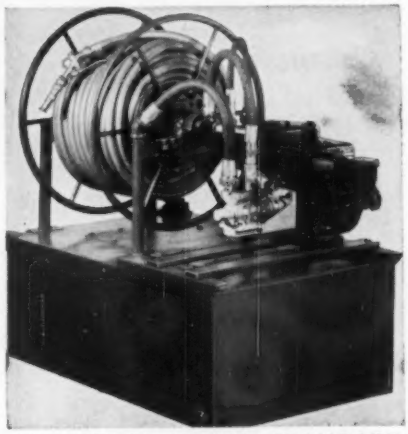

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The Multiple Problems of Multiple Use

John A. Zivnuska

THERE is an old saying that we learn from history that we do not learn from history. Nonetheless, it may be useful to open this discussion with some highly generalized and simplified history.

How did we get where we are now? The early forest reserves were plucked wholesale from the public domain. All manner of wildland was included—fine commercial forests, open woodland-grass types, chaparral, grassland, and barren alpine areas. The Forest Service, inspired by the perception of Gifford Pinchot (*6*) that "forests, waters, lands, and minerals . .all . . fitted into and made up the great central problem of the use of the earth for the good of man," set about to manage these varied lands for all of the varied purposes which could contribute to the general welfare.

This was an era of happy platitudes. The obvious need was to get programs started. With no investment in resource management under way, the questions of investment efficiency were not germane. Slogan terms and phrases which dramatized involved concepts could serve a useful purpose in rallying public support. And so we had and still have such ethically loaded ambiguities as "conservation," "the greatest good of the greatest number for the longest time," and even "woodsman, spare than tree." Among these terms, "multiple use" had an honored niche. Wildlands were plentiful and cheap, various uses could be developed with little conflict, and in fact development for one use frequently contributed to usefulness for other purposes as well.

Today, with 60 years of organized forestry behind us, these simple relationships no longer prevail. Just as the first half of this century opened with the passing of the agricultural frontier, so the beginning of the second half was marked by the passing of the wildland frontier. In 1940 there were 132 million people in the United States, 14 million people in the West, and general expectations were for a continuing decline in population growth and a stable population with a maximum of perhaps 180 million people. Against these expectations, wildlands still appeared abundant. By 1960 we already had 180 million people and the West had doubled to 28 million people. General expectations are for even more rapid increases in the future. Wildlands are suddenly scarce, and in many parts of the West values have soared fantastically. In this dramatically changed setting the forestry slogans of the past have an increasingly hollow ring.

What Is Multiple Use?

Exactly what do we mean by "multiple use"? In a restricted economic sense, the term simply means that forests and wildlands have more than one use—that the typical forestry enterprise produces more than one product. In itself, this is certainly no novelty in our economy. Indeed, it is the multiple product enterprise which is representative of our entire economy, and the single product concern which is the rarity.

Thus multiple use might be interpreted as a slogan term for multiple products. These multiple products may be the joint products of traditional production economies —two or more products resulting from a single process, such as the production of peeler logs and sawlogs from the harvesting of a tree. They may also be the products of production processes which are separate except for the sharing of some managerial input—an area in which traditional economics is somewhat hazy.

But multiple use is something more as well as something less than an economic term. It also describes a particular philisophy and method of land management—a method closely identified with the approach of the U. S. Forest Service. The basic concept here is that efficiency

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in the management of the varied resources of forest and wildland areas for various purposes is best obtained under a single coordinated administration. The administering agency or enterprise must be empowered to respond to *all* of the values and costs involved. The resulting land use pattern is characteristically an intricate mosaic of uses, both complementary and competing.

In terms of this concept of management, current arguments that the National Park Service or other preservation agencies are engaged in multiple use simply because the lands are watersheds as well as recreational and aesthetic areas can only be termed specious. Such arguments, of course, simply illustrate the dangers of excessive reliance on slogan terms.

There are other views of multiple use as well. One enjoyable definition, at least salted with truth, was given by David Brower (*1*) of the Sierra Club: "The multiple-use concept . . . was a political scientist's dream. . . . It could establish a protective cordon of interest groups that could be played against each other on the periphery—and at dead center all could be calm. Are the miners asking too much? Just point this out to the grazers, loggers, water users, and recreationists."

The central problem of economics has been said to be the allocation of scarce means among competing ends when the objective of the allocation is the maximization of the attainment of the ends. Certainly the key problem in multiple-use management, as in any multiple-product enterprise, is the optimum allocation of the land and the other economic resources among the various possible uses. And it is important to realize that with the passing of the wildland frontier we are increasingly confronted with competing uses rather than complementary uses. As Charles Connaughton (*2*), president of the Society of American Foresters and regional forester for California, has said: "The application of the multiple-use concept in forest land management is most easily obtained where there are ample accessible public forests to satisfy public demand. The real problems arise when demands of people exceed the available resources of the land as is becoming increasingly apparent in the West."

In short, the question of resource allocation becomes important only when resources become scarce and take on value.

Economic Models

The economic model for resource allocation in a multiple-product situation is clear enough. Maximization of the attainment of ends will be achieved when resources are allocated among the multiple uses or products in such fashion that the marginal returns per unit of input from all uses are equal. If the last input applied to forage production is returning more than the last input applied to timber production, then total returns can be increased by shifting resources from timber to forage. In such a marginal calculus, full recognition must be given to value and cost interrelationships among the uses. These complementary and competing relationships result in substantial operational complexities in the application of the model. If only uses internal to the management unit are considered, this model will define the allocation of a fixed budget which maximizes the internal rate of return. If alternatives outside the management unit are recognized through including the constraint of the guiding rate of interest or alternate rate of return, then the model will define both the optimum budget and its optimum allocation.

More elaborate models have been presented. For example, in the first issue of *Forest Science* G. R. Gregory (*4*) developed the multiple-use concept in terms of iso-cost and iso-revenue curves. Others have proposed the techniques of programming as the analytical approach to the problem. Such model building is an enjoyable intellectual exercise and may shed further light as to the precise relationships involved. It is not the route, however, to solving the dilemma of multiple use.

A basic problem to be faced is the very low level of knowledge of the physical relationships and values and costs involved in the various uses which can be made of forests and wildlands. All economic models which have been proposed require some knowledge of production functions, cost functions, and value functions. By a production function we mean simply the various possible physical inputs which can be achieved from various possible combinations of outputs. Here our knowledge is rudimentary at best. The cost function appears to be a less difficult problem, requiring only knowledge of factor costs for the input combinations. The value function, however, is again a major difficulty as a result of the extra-market nature of certain of the outputs resulting from wildland management.

We recognize intuitively that great importance must be attached to these extra-market consequences of land management. Thus the land manager is brought to grips with a general problem in resource allocation of increasing national concern. The market economy is a significant and powerful social institution because it provides a useful basis for comparing values which would not be commensurable in the absence of market institutions. Increasingly, however, resources are being allocated to areas such as education, public health, and public safety which lie wholly or in part outside the market economy. The problem of making valid comparisons between values having market expression and extra-market values is as yet unresolved. Economic research must be directed to the quantification of such extra-market values, but there may well be a basic lack of commensurability between market values and extra-market values that is not fully susceptible to economic analysis. Thus reliance must also be placed on the development for appropriate social institutions for controlling such resource allocations.

A brief discussion of timber, recreation, and watershed influences will serve to illustrate these problems.

Timber Management

Even their severest critics (who seem to be increasing in number) attribute to foresters a consider-

able knowledge of timber production, but actually such knowledge is surprisingly fragmentary. Our silvicultural prescriptions tend to be on an "all or nothing" basis. A particular set of practices is recommended to develop a fully stocked plantation. But what are the probabilities that these practices will lead to stocking of various degrees ranging from zero to full stocking? And if these practices are modified in some degree, how are these probabilities changed? By and large, research in forest management has not yet even been directed to such questions, but until we have some idea as to the answers we can be in no position to make refined analyses of economic alternatives.

Among factor costs the greatest difficulties lie in the question of the cost of capital, or, in simpler terms, the rate of interest to be used in financial calculations. This long-discussed problem almost certainly has no single or enduring answer. All factor costs, of course, are subject to major uncertainties as a result of the great length of the production period.

Timber values are interpreted by the market place, and good evidence of current values can be obtained even though the timber market is subject to major imperfections. Again, a very high degree of uncertainty is attached to any estimates of future values as a guide to current production decisions.

Management for Recreation

Knowledge of the management of wildlands for outdoor recreation is even less developed. One major aspect of this problem is so obvious that it often seems to be overlooked. Recreation is not a single, consistent use of land, but a whole group of widely varying uses, often sharply conflicting with one another. Their number is legion—the noisy outboard enthusiast *vs.* the solitude-loving canoeist; the ski resort development *vs.* the beauty of the unmodified natural scene; cabin sites *vs.* campsites; the naturalist with his love of the forest primeval *vs.* the deer-hunter appreciative of the more bountiful herds of cutovers and recent burns; and on and on. Thus within the classification of recreational land management we again face all the problems of multiple products and the need to achieve an intricate mosaic of uses.

For each of these uses we again need some knowledge of input-output relationships. The whole vast area between the attempts at simple preservation through deliberate inaction (the wilderness and wild area approach with its inevitable frustrations through the impact of increasing human use and peripheral change) and the intensively landscaped urban park is almost wholly unexplored. Current recreational management of forests is at best a defensive action; except in the area of game management positive programs to manage forests for increased recreational outputs have been little studied.

The question of the value of the output in recreational management has been much more widely discussed than the production process itself. What is the economic value of recreation? What is it worth?

In looking at these questions, the first thing to recognize is that the extra-market nature of outdoor recreation is institutional in origin. It results from the public policy decision to provide such recreation either free or at nominal charge. There is nothing mysterious about recreation per se which makes it an extra-market value or an intangible. Commercial recreation is widespread throughout our economy. We have perfectly good market expressions of the value of the chance to attend a football game or an opera, to week-end at a resort, to ride a roller coaster, or to own a great work of art. Furthermore, in at least some areas of the United States there is an active market for small forest properties for recreational use. The values of land adjacent to Lake Tahoe are certainly not determined by their potential as timber sites! And some of our ranches in the Coast Ranges are now obtaining more income from leasing hunting rights than from livestock operations.

Thus outdoor recreation as an extra-market service is primarily an issue on public lands. But this makes it an issue of great concern in the West. According to the recent progress report of the Outdoor Recreation Resources Review Commission (*5*), 22 percent of the total area of the West is recognized as nonurban public designated recreation areas. These 170 million acres include 71 percent of the total of such recreational areas in the United States (excluding Alaska and Hawaii).

Many different attempts have been made to express the value of such recreation. Perhaps the crudest and the most common are the various estimates of total expenditures by recreationists. For example, a survey conducted for the U. S. Fish and Wildlife Service (*8*) estimated that in 1955 some 25 million American anglers and hunters spent nearly $3 billion for 500 million days of sport. But what does this mean about the value produced by allocating resources to provide hunting and fishing opportunities? Absolutely nothing. These expenditures were for food, lodging, travel, clothes, guns, rods, and similar items. These values account for the three billion dollars, and there is nothing left over as a return to the recreational use of the land.

Certainly the particular groups serving the recreationists are benefiting from these expenditures, and data on expenditures may well be highly useful in gaining the support of such groups in lobbying for larger budgets for recreation. Just as the motel owner may invest in a swimming pool to increase his volume of patronage and net earnings, so the recreational service groups in an area may support investment in recreational facilities. But from a broader public standpoint, all that this is achieving is a transfer of expenditures from one group to another; there is little if any net gain to society from this level of effects. The social case for public support of recreation must rest on the values to the users, not the increased profits of certain recreational service industries.

Recognizing the lack of meaning in the simple expenditures approach, various economists have attempted to use these data in more

sophisticated ways. For example, Trice and Wood (*7*), following a suggestion by Hotelling, have used expenditure data in an effort to estimate consumer surplus. Crudely stated, the idea here was that since the recreation area has values which attract somewhat distant users at fairly high expense, then all closer users who get to the area at lower expense are enjoying some sort of surplus. There are a number of practical obstacles to such an approach, but the entire concept founders on the fact that the notion of consumers' surplus rests on an invalid interpretation of the Marshallian demand curve. This literally involves a footnote to economic theory and does not deserve exploration here. The essential point is that any estimate of consumer's surplus cannot be weighed against market values as a valid guide to resource allocation.

A more recent effort is an ingenious approach to deriving a demand curve proposed by Marion Clawson (*3*) of Resources for the Future on the basis of travel zones and expenditures data. Unfortunately, this approach involves combining nonhomogeneous items in developing the quantity variable and ignoring the highly important differences in alternate recreational opportunities characteristic of the user zones in developing the price variable. Thus again the model does not appear valid for its intended use.

All such efforts to derive the economic value of publicly supported recreation seem sure to end in frustration because of a failure to identify the exact nature of the value to be estimated. The services provided by a recreational area or opportunity are consumers' goods. Unlike producers' goods, such consumers' goods are not purchased to produce income; instead they are purchased for motivations which may not be known, but whose force is presumably reflected in market price.

It is not the function of the economist to attempt a direct appraisal of the "worth" to people of consumers' goods. When the motive on the demand side is anything other than the production of cash income, the economist's or appraiser's function is only to appraise the force of the motives, not the motives themselves. The economist may be able to estimate the costs of such goods and in some cases he may be able to predict the price which people will pay for them, but it is not his role to estimate what they "should" pay.

In short, the economic value to society of public recreation areas is determined by what society is willing to pay to have such areas. The economist would do better to look at such evidence of society's decisions than to attempt the inappropriate task of appraising the benefits obtained from a consumer's good.

Such an approach places sharp limits on the role of the economist and does not promise any general solution. Analysis of actual transactions involving public investment in recreation could, however, provide useful guides to administrative decisions. To date very little has been done in exploring this approach.

Watershed Management

Similar uncertainties and lack of knowledge are found in the area of watershed management. While research has established certain highly important principles of watershed relationships, quantitative data of the production function type are almost wholly lacking. The problem is made the more difficult by the complex nature of water yields. Water must be considered in its three dimensions of quantity, timing, and quality. In general, there appears to be a tendency for improvements in timing and quality to be achieved only at some loss in quantity.

From the economic standpoint, it is helpful to identify two separate functions of watershed management. One is the influencing of the total quantity of water and the other is the reduction of damage from erosion, siltation, and floods.

At the risk of oversimplifying the question of water yields, it can be noted that in California the average annual water yield is 71 million acre-feet, while the ultimate requirements are estimated at 46 million acre-feet. The water problem of the state is one of storage and distribution, not of quantity. Oregon and Washington are even more abundantly endowed with water. With the exception of certain special areas such as the Central Basin and Southern California, or of unusual drought, the marginal value of water on the watershed appears to be zero. On most of our forest lands the popular conception of squeezing more water from our watersheds would probably not be economically useful.

The reduction of damage from erosion, siltation, and floods, however, is commonly an important function of land management. The measures required are quite different than those for increasing water yields, and fortunately are usually compatible with other uses managed on a permanent, productive basis. To the extent that special measures are required, the value of the reduction in damage can serve as a guide to resource allocation.

In this problem of valuation, engineering data can provide some upper limits. The value of vegetation management to control such damage cannot be higher than the cost of engineering practices (debris basins, impoundments, etc.) to achieve equivalent effects. There is always the possibility, of course, that the economic value is considerably less than this maximum and that no special programs are justified. Efforts at the direct estimation of such values have generally been blocked by the gross inadequacies and uncertainties of knowledge of the physical relationships involved.

The Problems of Public Decision

From all of this the conclusion emerges that in the issues of multiple use of forests and wildlands, the economist is better at asking questions than at providing answers. The asking of valid questions is in itself a useful function and can help in coming to sound decisions. But the administrator must come up with answers now, however fragmentary and inadequate the basis for reaching his decisions. In doing this, his prob-

lems are not eased by the anomalies of our public policies affecting land use.

In fiscal 1960 the Forest Service received $140 million from timber sales, $4.5 million from grazing fees, nearly $2 million from mineral leases, a little over $1 million from recreation, and about $0.5 million from miscellaneous sources. This, however, cannot be interpreted as an indication of the values produced by these forests. Both on the national forests and on other public lands, the various products move toward the consumers under very different policies. Timber is appraised for sale at its estimated full market value and is sold for as much more than this as competitive bidding can produce. Forage is sold through the medium of grazing permits, which have generally been held to involve a fee structure below market value. Recreation is provided either free or at nominal charges. By and large, water simply flows from the land, and the prevention of damage produces no cash.

Essentially these differences reflect historical accident and administrative problems rather than carefully considered economic policies. Through prolonged usage and acceptance, they have set in motion a variety of economic forces and the development of vested interests in their perpetuation. For example, the benefits of the less-than-market value fee structure for grazing have long since been capitalized into the values of the participating ranches, and thus have been transformed into costs to the present owners.

The widely acclaimed multiple-use act of 1960 (Public Law 86-517) does not appear to have shed much light on the administrator's problems. This act states that "it is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes." This does not establish any priorities among uses, with the listing being simply alphabetical in order—although some skeptics have noted that, except for the modifier "outdoor," recreation would appear second rather than first in order.

The act then proceeds with some pious admonitions for "the most judicious use of the land" and for "harmonious and coordinated management" and firmly states that multiple use is "not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output." The major degree of administrative discretion implicit in such a Congressional mandate may well be wise policy under the circumstances, but it leaves the primary issues of multiple use wholly unresolved.

In the public sector of the forest economy, multiple use is clearly an instance of incremental policy making. We move by a series of small steps, with action guided by reaction. Public control is exerted primarily through the appropriation bill, which itself is largely conditioned by the previous appropriation measure. Economic analysis is inadequate to provide clear-cut answers to the problems of resource allocation. The public forest administrator appropriately is responsive to political stimuli as well as to economic stimuli.

A successful labor arbitrator once stated his test of a successful arbitration. If labor was happy and management angry, the arbitration was poor; similarly, if labor was angry and management happy, the arbitration was poor; but if both sides were equally angry success had been achieved. Under this criterion, the Forest Service seems to have been remarkably successful in several recent controversies.

In all seriousness, controversy is the medium for multiple-use decisions in the public sector. In the market place of the private sector, costs are usually borne by the individuals receiving the benefits. With the extra-market products of the public sector, quite the opposite is characteristic. Costs are borne primarily by some groups, while benefits are enjoyed by others. Conflict between local interest and national interest is almost constant. Controversy is inevitable in such circumstances and serves to bring out forcefully the varied interests affected by the decisions to be made.

David Brower (*1*) was sound in his allegation that in multiple use the Forest Service is constantly balancing one interest group against others; he was wrong in inferring that the position of dead center is one of calmness and inaction.

The Private Sector

Multiple product decisions must also be made in the private sector of the forest economy. Here the criteria of the market place can be given primary, but not sole, recognition. Commodity production tends to be dominant since it is the primary source of cash income.

Costs and benefits accruing to others are not of immediate concern to the private owner. Thus watershed management aspects rarely are primary considerations on private lands. Under the complexities of water law, exact title to water is not always clear, but it certainly does not belong to the owner of the land on which it happens to fall. Nonetheless, the private owner cannot wholly ignore watershed effects, since the political consequences of watershed influences may have pronounced economic effects on his operations.

In recreation the situation is highly variable. The more intensive and commercialized forms of forest recreation are well established on private lands—resorts, cabin sites, organization camps, and so on. Impact on land values is making itself felt increasingly. In the less intensive forms of recreation such as camping, hunting, or picnicking, the private owner has been discouraged from much participation by the competition from public recreation priced at less than cost. The efforts that are made at such management are commonly charged to public relations. Study of current trends in recreational use suggests that both the free use of public lands and the free use of private lands deserve serious restudy, and that the issues involved are rapidly increasing in urgency. Certainly the desires of our highly urbanized, recreationally minded society are going to have a tremendous impact on private forest lands in the years ahead.

And while he may rely on the criteria of the market place, the

successful private forest land manager must be highly perceptive of the changing needs and desires of society, both in material goods and in services. His production efforts will bear full fruit only in the somewhat distant future, and, as society changes, the signals called by the price structure will also change.

The Role of the Forester

From all of this it follows that the successful forester must be far more than a skilled technician. Society's growing concern with the multiple uses of the forest resource will test the forester's claim to professional status.

In reaching a pragmatic and workable solution to the multiple problems of multiple use, the forester occupies a central position and he can validly claim a key role. Through education and experience he is qualified to judge the complex interactions of the production functions for the several uses of forests and wildlands and he is aware of the various values resulting from management. He sits at the focus of all the forces of supply and demand socially relevant to the final management decisions. Thus, if he approaches his problems with full comprehension of his responsibilities and of the society which he serves, he has a more valid base for contributing to management decisions than any individual or group not situated at such a focus.

Decisions affecting the multiple uses of forest land cannot be made by standard formulas or rules learned by rote. Neither will economists nor other research specialists develop neat analyses providing all the answers. Instead, the forester must work in uncertainty and controversy, the heat of which will reflect the growing importance of the resource for which he is responsible. In this very real sense, multiple use is more the symbol of the problems we face than a simple method for their solution.

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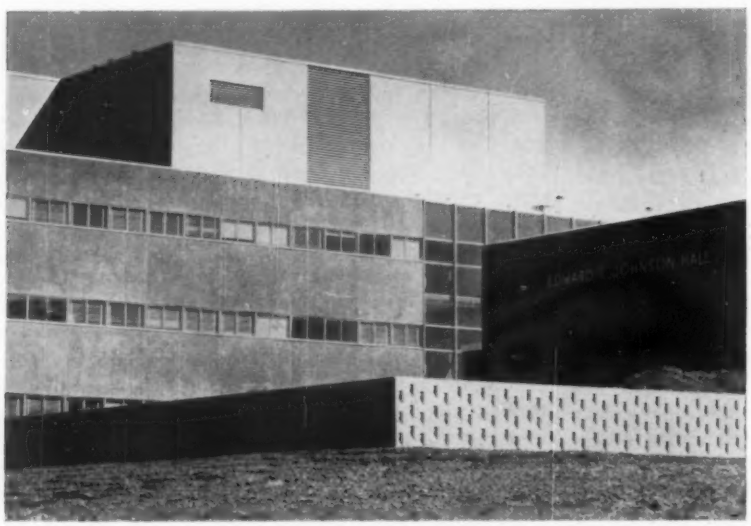

A NEW $4,000,000 structure to house the agricultural plant sciences departments of Washington State University was dedicated in Pullman July 12.

Governor Albert D. Rosellini made the official dedication address.

WSU's departments of agronomy (crops and soils sections), entomology, forestry and range management, horticulture, and plant pathology moved into the new four-story structure last January,

The new facility features an inner core of air conditioned laboratories and classrooms ringed by offices, studies, and other laboratories. Well over half of Johnson Hall is being used for research into various agricultural problems.

Helicopter Attack—Its Control by Unit Area

James L. Murphy

THE USE of a small helicopter can cost a resource management unit over $100 per hour; on a project fire as much as $1,000 per day. It is small wonder that many national forests and other agencies seek methods of administration that make every minute of use count.

Helicopter Attack by Unit Area Control

Most foresters are familiar with the concept of unit area control in timber management. It is an intensively applied technique tailored to a specific area to attain a specific objective. In our case, the objective is an efficient and economic helicopter-attack or helitack[1] operation. The unit area is the area to which the intensive management is to be applied. Control is the aim of management and is brought about by preparing and executing a program of planning and development. This paper deals with unit area planning for helitack and the development that might be necessary to achieve planned control.

The Helicopter Attack Test Unit

In 1958 the Plumas National Forest in the Sierra-Nevada Mountains of Northern California was chosen as a helicopter attack test unit. A research and development program was carried out by the U. S. Forest Service, Pacific Southwest Forest and Range Experiment Station, and the Utah State University during the year and had as its objective "integrating the small helicopter into forest fire control and other forest management jobs." The Plumas Forest was chosen because its problems and the conditions under which these problems occurred were similar to those found on most forests throughout the West. A plan for an administrative unit describing necessary steps in justifying the use of the helicopter, planning for its use, training for its use, and guidelines for its safe, efficient, and economic management was the project's result. The plan was later adapted to the Payette National Forest in Idaho. The following discussion summarizes the plan as applied to these forests.

Justifying the Use of the Helicopter

The helicopter is a costly and potentially dangerous resource management tool. It has many limitations. If used under the right conditions to solve the right kind of problem, however, the helicopter can be just about "priceless." Any unit planning its use should take time to establish sound justification for the operation. Analyzing a few basic considerations will help with that justification.

Does a real problem exist?—Two of the biggest problems facing resource managers are speed and accessibility. Even though many miles of road are added to mountainous area transportation systems each year, the problems of speed and time still remain. It may take many hours to reach a fire in remote country even by the most modern means of ground transportation. Air travel then, may be the answer in high value, inaccessible country where existing ground transportation cannot meet the requirements of efficient management.

Can helicopter-attack handle the problems?—1. Helicopter availability. Helicopter service is ordinarily obtained by rental from qualified contracting agencies. Helicopters may be rented at a specified rate for a specified contract period and placed on permanent standby within a work area such as a national forest. A minimum number of flying hours may be guaranteed the helicopter company during the contract period. Helicopter service may also be obtained as a result of a "verbal agreement." This type of arrangement places the helicopter on call at its home base. Flying rates are agreed upon at the time the agreement is made. When a project requiring the services of the helicopter is anticipated, the helicopter is called in only for the project period. It does not ordinarily remain on permanent standby.

2. Operational dependability of the helicopter. Helicopters fly according to density altitude rather than pressure altitude. Density altitude is pressure altitude corrected for temperature. A helicopter may be operating at a pressure altitude of 5,000 feet, but if it is an unusually hot day, since hot air is less dense, the true operating conditions may be equivalent to 8,000 feet, its density altitude. If most of the problem areas on the unit have extreme elevations with high summer temperatures, care must be taken in choosing the helicopter for the job. If it is necessary to rent a jet-powered helicopter for example, with its increased power, the rental rate may be prohibitive.

Turbulent wind conditions could impose limitations on helicopter operational dependability. Consistently steady winds, on the other hand, should aid helicopter opera-

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This article is based on a Master thesis prepared at Utah State University under a U. S. Forest Service research grant.

[1]Helitack: The use of helicopters in attacking forest fires.

tion in most cases. For every additional mile per hour wind between 10 and 30 miles per hour some 15 pounds additional weight may be carried by the helicopter with the same takeoff performance.

Topography must be considered when evaluating an area, for the helicopter will need potential landing spots within the hazardous inaccessible portions of the forest. A small helicopter requires a 50-foot diameter clearing from which to take off under the best conditions. At elevations above 5,000 feet, the ship may need a 300-foot take off path to achieve flight. If landing spots are not always available, there must be areas on which helicopter hover-jumps (helijumps) can be made. Extremely rough, rocky terrain could be limiting to helicopter landings or to helijumps. An examination of aerial photographs and a reconnaissance flight over the potential use areas should indicate that sufficient open spots are available on ridges and in canyon bottoms for possible helicopter operation.

Broad continuous stands of heavy timber or brush could offer extreme resistance to helispot construction or produce dangerous conditions for helijumps. Open spots should exist on ridges and meadows and large areas should be available in the canyons. An efficient network of helicopter landing spots or helispots must be possible.

3. The cost. Once it has been established that a problem of accessibility exists on a resource management unit, then various alternatives to solve that problem must be considered and weighed. Will it be cheaper to expand the existing ground organization and facilities to achieve efficient travel coverage or can the coverage be attained by air travel?

Helicopter rental rates may vary from $80 to $120 per hour for most small helicopters in general use. Minimum guarantees on permanent standby contracts average around 160 hours. Seasonal cost of a small helicopter may vary from $15,000 to $20,000 for a permanent standby ship. When compared to the annual cost of other alternatives, however, it may be cheap—and a helicopter can begin work now. It may take 20 years to complete a road system.

4. Consider the intangibles. The use of helicopters on forests throughout the West has demonstrated many intangible benefits realized by the field crews.

a. Rescue operations. The speed and flexibility of the helicopter make it possible to reach inaccessible areas quickly and land in small openings. Injured personnel may be airlifted to a doctor, or hospital, in hours instead of days, in many cases.

b. Morale. Fire crews as well as other project crews have a definite sense of security in inaccessible country when they know they can depend upon helicopter transportation in the event of some type of disaster. Panic is much less likely to result when a serious injury or illness strikes under these conditions.

c. Safety. Helicopter-delivered crews get an aerial view of the entire fire or other project, and its hazards, and are not fatigued by long hikes. As a result, they are better able to cope with emergency situations.

d. Versatility. Almost all forest management projects are dependent upon an efficient transportation system. Problems arise when projects are to be carried out in inaccessible areas. The helicopter working from an efficient helispot network has a potential use in almost all phases of forest management: timber surveys, fire prevention patrols, range surveys, aerial seeding, and game census, to mention a few.

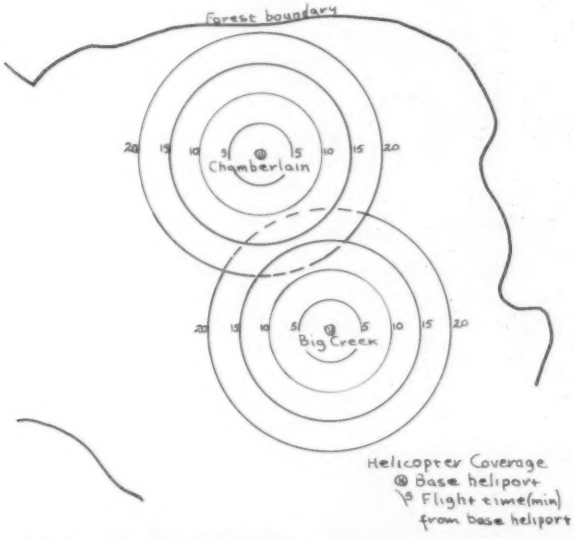

FIG. 1.—The maximum coverage from the base of operations must be determined to find how much of the unit is accessible to the helicopter within hour control standards. Getaway times, reconnaissance times and hiking times must be added to the flight times to determine the true elapsed time interval.

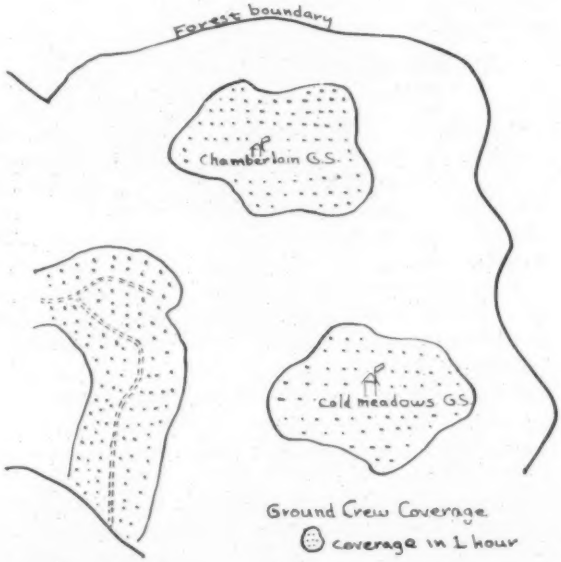

FIG. 2.—Areas where present coverage by ground crews is adequate must be determined. These areas may not be given high priority in helicopter initial attack planning.

e. Efficiency. Use of the helicopter reduces travel time to fires and other projects. Aerial reconnaissance assures quick, decisive initial action that can result in more efficient work on the ground.

Intangible advantages such as these can only result in one tangible advantage; economy of operation. If helicopter use is justified after a sound analysis of the problems and their alternative solutions, then planning is the next step.

Planning

Although the helicopter is adaptable to many phases of resource management, it has been most used in the field of fire control. Planning for an efficient helitack fire control program must be most intensive, particularly on so-called "fire forests." All other fields of management may take advantage of the facilities and training which result. The following phases pertain to planning for fire control but will serve other projects as well.

Helicopter attack will never completely replace the ground fire organization. It has proved to be only another tool to strengthen the existing fire organization.

Helicopter coverage. — Permanent bases of helicopter operation called base heliports must be located where the maximum amount of initial attack coverage over the unit is possible. Four time increments should be used in selecting base heliport location (Fig. 1).

1. Getaway time (experience on time tests). Average safe warm up time for the small gas engine helicopter is 3 minutes.
2. Flight time from base heliport to a fire (a mile-/minute for most small helicopters).
3. Reconnaissance-to-touchdown time, or an average time to reconnoiter the fire, report its location and condition, select a landing spot, or helijump spot, and put the firemen on the ground.
4. Ground travel time from the landing spot to the fire, traversed by the fireman.

The total of these time increments should be *less than the hour control standard*[2] *set up for the unit.*

Establishing base heliports.—On the basis of the best helicopter coverage, specific locations must be found for base heliports. Important points to consider are: accessibility by road, size (each small helicopter needs safely a 50-ft. diameter operating area), hazards such as power lines and trees, prevailing winds, higher elevations so as to eliminate uphill helicopter climbs to fires, dropoff for takeoffs at elevations above 5,000 feet, dust proofing and heliport identification.

Location of reinforcement crews. —To maintain the most flexible operation, ground crews (tanker crews, timber crews, hotshot crews, etc.) should be trained and equipped to function as reinforcement crews for helicopter attack. These crews will respond by trucks to preselected helicopter rendezvous points, called reinforcement heliports, to be picked up by the helicopter and ferried in to the fire. In this manner the old principal of "move up" may be utilized in the helicopter operation.

Determination of priority zones. —Areas where helicopter attack will be the quickest and most effective means of attack must be determined. Areas with presently adequate ground coverage may not be included in helitack zones. For helispot construction priorities and manning and dispatching guidelines, specific priority zones should then be determined within these

[2]Hour control standard: Maximum elapsed time from start of fire to first effective action on fire allowable to keep a unit's burned area within the burned area objectives.

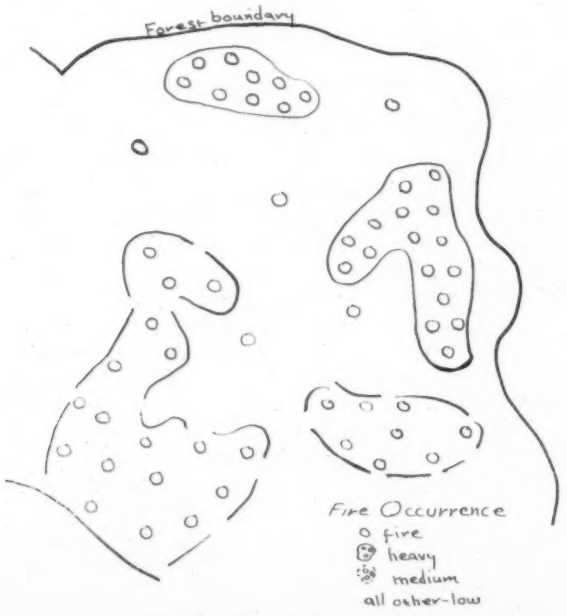

FIG. 3.—Fire occurrence patterns over the past ten years will show where the fires are most likely to occur. If these concentrations are in inaccessible areas then the country may be a helitack zone.

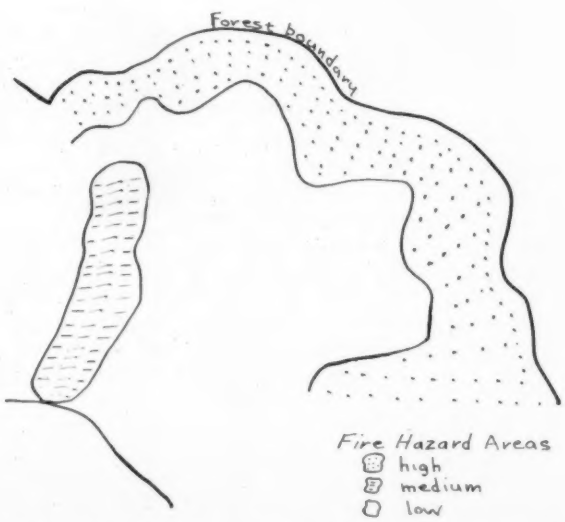

FIG. 4.—Fire hazard zones based on the cover types over the country will show where a high rate of spread and extreme resistance to control will occur.

broad helitack zones. One method makes use of four map overlays:

1. Areas where present ground crew coverage is adequate to keep within hour control standards (Fig. 2).
2. Fire occurrence pattern over past 10-20 years (Fig. 3).
3. Fire hazard zones based upon cover types (Fig. 4). These three overlays, on top of each other on a tracing table, give the fourth overlay, priority zones.
4. Priority zones. Area covered by ground crews may be eliminated. Hazard and fire occurrence overlays are combined into high, medium, or low priorities. (e.g. high hazard—high fire occurrence would naturally be highest priority.) These priority zones are helpful to a dispatcher in determining the number of men to "move up" to the nearest reinfrocement heliport (Fig. 5).

Special problem areas such as recreation and wilderness areas may be thrown into high priority zones, and the zone boundaries smoothed out on the basis of local experience.

Location of reinforcement heliport.—Helicopter rendezvous points, or reinforcement heliports, should be located on the edge of helitack zones for the quickest secondary action. Reinforcement crews and equipment are dispatched to these heliports for aerial move up action. Reinforcement base heliports may be generally located by the following methods: (Fig. 6)

1. Locate helitack zones and nearest ground crew to the zone.
2. Calculate, on the basis of time increments already described (eg. getaway, flight and reconnaissance time), the time for the helicopter to deliver the fireman to a spot near a supposed fire. Add time for the helicopter to be in the air again.
3. Determine the specific location for the heliport by observing location points mentioned under establishing base heliports. Try to get these heliports on a high point, out of the canyons, to take advantage of prevailing winds and drop-offs for takeoffs.

Flight and hazard map.—Flight-times-at-a-glance and flying hazards to be encountered enroute are important in planning a mission. A master flight map might include:

1. Flight time in 5 minute intervals.
2. Hazard areas, such as power and telephone lines, smokestacks and consistently turbulent areas.
3. Landing and refueling areas.
4. Helitack zones.

Training for Helicopter Attack

Initial attack crews, reinforcement crews, and other personnel participating in helitack, should be trained as soon as possible by a qualified air attack man and the pilot. Helicopter safety, basic helicopter operation, equipment use and maintenance, related skills such as helispot location and construction, helijumping, etc. should be stressed.

Equipping for Helicopter Attacks

Base heliports must be furnished with operational facilities such as communications, wind socks, fire extinguishers, and safety regulations. Crew equipment and helicopter fire accessories such as the hoselay tray and helitank should be cached at base heliports.

Helispot Planning

Location.—An adequate helicopter landing spot, or helispot, network is basic to the most efficient use of the helicopter. Fire initial attack will require the most intensive coverage. On the basis of this fire initial attack network, other

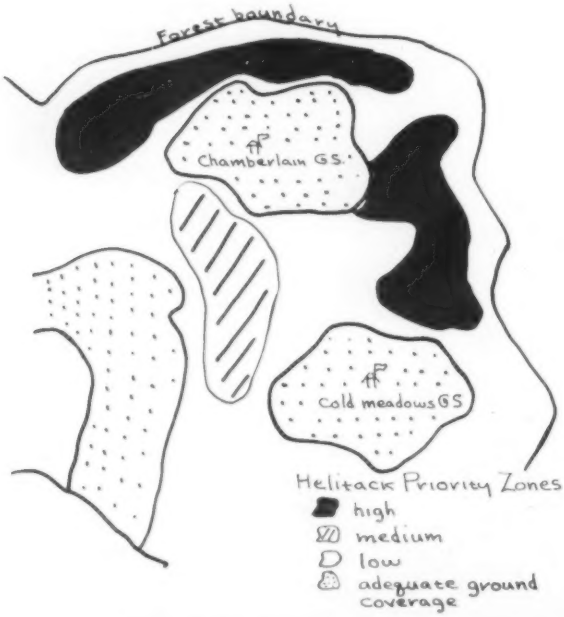

FIG. 5.—The three overlays, ground coverage, fire occurrence, and hazard zones, when combined will produce a fourth overlay, priority zones. The priority zone overlay will then give definite basis for helitack planning.

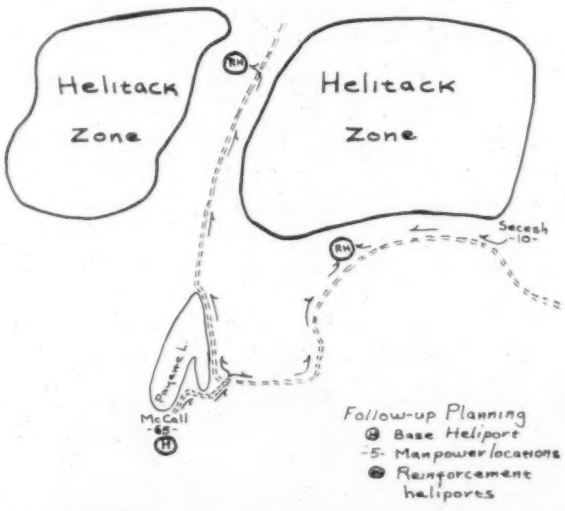

FIG. 6.—For quick moveup action helicopter rendezvous points, or reinforcement heliports, should be located at strategic locations in or adjacent to the high priority helitack zones. Men and equipment can be moved up to these heliports by ground transportation and then shuttled into the fire or other project by helicopter.

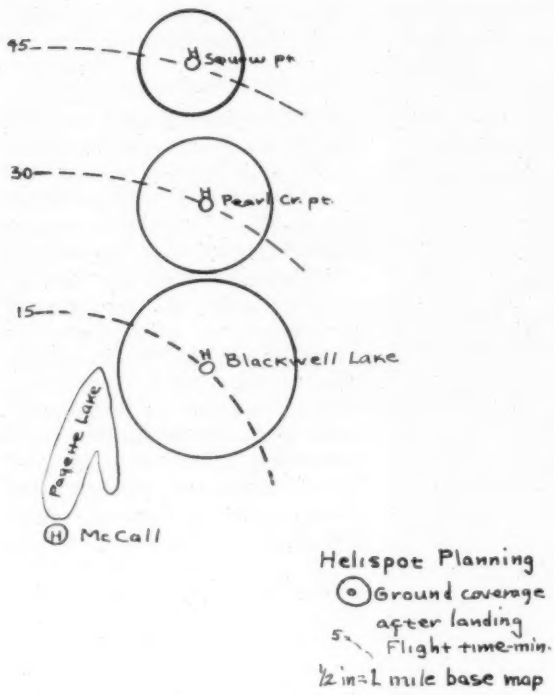

FIG. 7.—After a helispot has been located determine how far a man may be at the end of the hour control standard by adding getaway times, flight times, reconnaissance times and hiking times. A base map will give an extensive idea of helispot frequency necessary.

FIG. 8.—By using contour maps and aerial photos a more realistic picture of the hiking distance possible within the hour control standard may be obtained. For every intensive initial attack planning the hiking coverage possible may be varied to fit the topography.

projects, such as timber, engineering, etc., may be planned. Suggested steps for helispot location are:

1. Locate helitack priority zones. During a reconnaissance flight locate potential helispots in high priority zones first. Locate, land on, approve, and mark natural helispots during the flight. Record locations.

2. Locate natural existing and potential helispots on a map.

3. In the office, figure coverage possible on foot from each helispot within the hour control standard. Use initial attack time increments (discussed under heliport) from base heliport to landing, e.g. getaway, flight, reconnaissance-to-touchdown times.

4. Subtract this total elapsed helicopter time from the hour control standard (eg. ½-hour, 1 hour, etc.). This leaves the time left for the man to hike to the fire. Plot this time in terms of the distance possible for him to hike per hour in that cover type on that average slope.[3] Each helispot then will have a rough circle of coverage around it. A large ½ inch base map used in this manner will give an extensive idea of coverage. For intensive planning, use topographic maps and vary hiking coverage with the specific topography (Figs. 7 and 8).

5. From the above map work determine areas lacking helispot coverage and locate sufficient helispots to complete coverage in these areas.

Construction. — Plan the helispot construction program so as to use a minimum of flight time in order to keep costs down. Pick a good base helisport. Truck men to the heliport if possible; it is cheaper. Be sure all necessary equipment is assembled, packed and available. Check with the pilot for ship limitations. Plan for an aviation gas supply at the base heliport. Try to have the men placed on helispots before the heat of the day (10 a.m.) arrives. Be sure men are oriented in safety and helispot construction principles before beginning project.

Maintenance.—Inspect helispots each year if possible. Perform maintenance currently. Combine it with other projects so as to keep flying time to a minimum.

Identification and recording.—All heliports and helispots should be visible from the air and numbered. Records of the location of each helispot—its description and hazards should be filed at key stations. The helispots may be recorded by numbered pins on a wall map for instant reference by the dispatcher.

The Helicopter Use Plan

The actual use of the helicopter must be managed intensively for the most effective and economic operation. A helicopter use plan is important and should include:

1. Use policy specifying type of

[3]These hiking times were determined by time tests on the Plumas Forest.

aircraft to be used, qualifications of pilots and mechanics, and equipment to be furnished by contractor.

2. Permissible uses. Jobs for which the helicopter can be used most efficiently and under what conditions.

3. Priority of uses.

4. Guidelines for the use of helicopter accessories. Where accessories are to be located and responsibility for maintenance.

5. Communications plan. (a) Aircraft radio facilities—All aircraft should have radios. (b) Ground communication facilities, their location and type. (c) Air-to-ground communication plan. Lookouts may be specified as key contact and relay stations.

6. Manning plan. Helicopter and crew may be assigned to various base heliports in response to greatest fire danger.

7. Fire dispatching plan. Helicopter attack must be integrated with other air and ground attack.

8. Fire mobilization plan. Initial attack ond follow-up procedures using helicopter on small fires. Large fire procedures.

9. Air control organization and an air control plan for large fires and other projects.

10. Non-fire uses of the helicopter. Designate helicopter training responsibilities and need for trained supervisory personnel.

11. Operational forms and records. Specify what forms must be maintained and who is responsible for maintaining them.

Summary

Helicopters are a costly and potentially dangerous fire tool. When their use is justified to solve inaccessibility and transportation time problems, they can be a valuable tool. Unit area control, in which intensive planning, development, training, and management are carried out is necessary for the safest and most economic helitack operation.

NOTE: Copies of the Plumas National Forest Helitack Plan may be obtained from the Division of Fire Research, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

Yellow-Poplar Seedlings Intolerant to Flooding

Robert G. McAlpine

ONE OF THE outstanding needs of yellow-poplar (*Liriodendron tulipfera* L.) according to Auten[1] is ample soil moisture and relatively moist air. The site must not be too wet and the soil must be well-drained for best growth. Alluvial soils along the smaller creeks and branches of the Piedmont furnish apparently ideal yellow-poplar sites, and poplars grow along the banks of these streams to within 3 or 4 feet of the water level. Why, then, are yellow-poplars conspicuously absent from the deep, well-drained soils along rivers of the Piedmont, where normal stream level is 15 to 20 feet below the flood plains? The answer may be that rivers flood periodically for relatively long periods, whereas overflows of the smaller streams, though more frequent, are of short duration.

FIG. 1.—Drums used in flooding seedlings. Water was drained through a pipe at the base of each drum.

Characteristically, Piedmont rivers have broad, shallow channels and wide flood plains built up by deposition of soil from eroded farmlands. After heavy rains, the rivers spread out and cover the flood plains. Floods occur usually in the winter and early spring but occasionally during other seasons. The duration of the flooding period may vary from a few days to a week or more.

A controlled study to determine the effects of flooding on three species was begun at the school nursery of the School of Forestry, University of Georgia, in 1957. Yellow-poplar was given prime consideration. Green ash, very tolerant to flooding, and sweetgum, somewhat less tolerant,[2] were considered only as checks on the experimental procedure.

Methods

A series of 55 gallon drums, fitted with basal drains, were arranged in rows of 7 drums each (Fig. 1). Coarse gravel was placed in the bottoms to a depth of 1 foot and covered with a fertile loam soil to within 18 inches of the drum rims. Sawdust was placed around the drums to prevent excessive soil and water tempera-

THE AUTHOR is research forester, Southeastern Forest Expt. Sta., Forest Service, U. S. Dept. Agric. in cooperation with School of Forestry, University of Georgia, Athens.

[1] Auten, John T. Prediction of site index for yellow poplar from soil and topography. Jour. Forestry 43:662-668. 1945.

[2] Hall, T. F., and G. E. Smith. Effects of flooding on woody plants, West Sandy Dewatering Project, Kentucky Reservoir. Jour. Forestry 53:281-285. 1955.

tures. Twenty 1-year-old seedlings of yellow-poplar were planted in each drum with tops below rim level. In March of 1957 one row of drums was flooded according to random assignment for 1, 2, 3, 4, 7, and 14 days. One tank was flooded and drained immediately to serve as a control. In May the remaining row of drums was flooded. The seedlings were then in full leaf but the tops were still below rim level (Fig. 2).

Seedlings flooded during the dormant season were not adversely affected, and by early summer had grown well above the drum rims. These were flooded again in late June according to the same schedule as the dormant season series but the tops were now above the water level.

Green ash seedlings were planted after the yellow-poplar seedlings were removed in the fall of 1957. Sweetgum replaced the ash in the fall of 1958. Seedlings of both species were treated in the same manner as yellow-poplar.

FIG. 2.—Yellow-poplar seedlings planted in 55 gallon drums. Seedlings in the row on the left were flooded during the dormant season. The seedlings on the right were flooded in May. The drum in the right foreground has just been drained after 4 days' inundation. Immediately behind it are the 7 and 14-day treatments with water covering seedlings.

Results

Yellow-poplar seedlings were not adversely affected by flooding during the dormant season. In the early growing season (May), however, flooding proved detrimental. The leaves, which appeared in good condition before drainage, wilted and died shortly after water was removed. Mortality was noticed among seedlings flooded 4 days and became progressively greater as the length of the flooding period increased. In the control drum and drums flooded for 1 and 2 days the seedlings survived and made good height growth following drainage. After 3 days of flooding, growth was noticeably decreased. In the drum flooded for 4 days, 10 seedlings wilted and died. Only 6 survived the 7-day inundation. The upper portions of all seedlings in the drum flooded for 14 days died after drainage, although 1 sprouted from the root collar.

Yellow-poplar seedlings treated in June were affected in a similar manner. Seedlings in the control treatment and those flooded for 1 and 2 days were not adversely af-

FIG. 3.—Seedlings wilted immediately after water was drained from this drum.

fected, but 2 seedlings died after being flooded for 3 days. After 4 days of flooding, 3 seedlings were dead and after 7 days only 4 remained alive. Fourteen days of inundation killed the tops of all seedlings.

Green ash and sweetgum seedlings, subjected to the same treatment during the next two years, survived and grew well. There was no evidence of wilting when the drums were drained, and the flooding seemed to be beneficial rather than detrimental to growth.

Discussion

Death of the top portions of yellow-poplar seedlings, after 4 days or more of flooding in the early part of the growing season (May) and 3 days or more in early summer (June), is sudden, with wilting beginning almost immediately after water is drained from the drums (Fig. 3). Recent observations of flooding of a 4-year-old yellow-poplar planting on the flood plain of a Piedmont river[3] indicates that sudden wilting does not always follow the recession of flood waters. This plantation was flooded for 4 days in May of 1959. The first symptoms of flood damage did not appear for approximately 6 weeks, but after this, death of the above-ground parts was rapid.

Sprouts from the root collars of many seedlings in the drums, and young saplings in the plantation, indicated that the root systems were not killed. Apparently, tissues of the lower stem rather than the roots are affected, and death of the crown above this area occurs when girdling is complete.

Some seedlings were more tolerant to flooding than others. One sprouted even after 2 weeks of flooding. It is conceivable that an occasional seedling might survive extended periods of flooding without adverse effects. This suggests possible genetic diversity in resistance to flooding injury.

The inability of yellow-poplar to tolerate prolonged flooding during the growing season is probably the main reason trees of this species are lacking in the flood plains of the larger Piedmont streams. Almost without exception, the few scattered yellow-poplar trees found along these streams are on elevated fronts or terraces which are seldom flooded and then only for short periods of time.

Summary

In an effort to learn why yellow-poplar seldom grows on the wide flood plains of Piedmont rivers in the South, a study was started in Georgia in 1957. Yellow-poplar, green ash and sweetgum seedlings, planted in 55 gallon drums, were flooded for periods of 0, 1, 2, 3, 4, 7, and 14 days during the middle of March and latter parts of May and June. Green ash and sweetgum seedlings were not affected by up to 14 days of flooding during any month. Yellow-poplar seedlings were not adversely affected by dormant season flooding; however, mortality occurred after 4 days of flooding in the early growing season (May) and after 3 days in early summer (June). Wilting and subsequent death of the above-ground portions of seedlings increased with lengthening of the period of inundation until after 14 days all were dead. Wilting occurred immediately after water was removed from the drums.

Observations of a flooded plantation of four-year-old yellow-poplar saplings near a Piedmont river substantiated the findings of the controlled experiment. Trees, however, did not wilt until approximately 6 weeks after the flood.

Sprouting of some seedlings and saplings from the root collars indicated that not all root systems were dead. Generally, top-kill followed deterioration of tissues in the lower portion of the stems.

[3]McAlpine, Robert G. Flooding kills yellow-poplar. Forest Farmer 19(3):9, 13-14. Illus. 1959.

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Implications of the Klamath Fires of September 1959[1]

Harold Weaver

A WILD FIRE devastated almost 15,000 acres of ponderosa pine on the Klamath Indian Reservation of southern Oregon in early September 1959. Two other wild fires were controlled on the same day. In earlier days this same forest was burned frequently, without apparent serious damage, by surface fires of comparatively light intensity. In previous publications the writer has attempted to explain and trace the ecological changes that have caused these latter day fires to become so destructive. Also he has suggested that prescribed burning may be used as a hazard reduction tool toward prevention of destructive fires (*1-6*).

At fortunately close proximity to the September burn is an area that has been treated by prescribed burning at frequent intervals since November 1939 (*5*). Stand and fuel conditions are such that development of a damaging wild fire would now be almost impossible. The writer's purpose is to describe in more detail the changes and conditions that preceded the devastating fire and that now characterize extensive portions of the unburned forest. With these he will contrast conditions on the area treated by prescribed burning. From this and from accompanying illustrations there may be developed conclusions regarding need of application of the treatment on a wider scale for hazard reduction and stand improvement.

Ecological Changes in the Klamath Forest

Fire scars on living trees offer mute but irrefutable evidence that in earlier days the forest was burned over frequently by comparatively light surface fires. The forest maintained itself under these conditions for countless centuries. The first white men found a magnificent, park-like forest of ponderosa pine with a grassy forest floor. Descriptions by older whites and Indians help us visualize these conditions.

Harry Engle, an elderly resident of Fort Klamath, Oregon, still recalls vividly the days when he rode the range in the Sprague River—Swan Lake—Hildebrand area in the late 1880's and the 1890's (*4*). The forest was open and park-like with considerable grass. There were clumps of manzanita (*Arctostaphylos* spp.), snowbrush (*Ceanothus velutinus*) and bitterbrush (*Purshia tridentata*), but these shrubs seldom grew very high because of the frequent fires set by cowboys and lightning. To the specific query if there were young trees Mr. Engle replied that there were scattered groups of saplings and trees of pole size. He explained that fuel seldom accumulated in sufficient quantity to enable the fires to become very hot. Therefore many of the young trees survived. The writer has already traced the process whereby groups of young trees became established and survived in the primeval forest (*1, 2, 3, 4, 6*).

In 1929 Jack Horton, an elderly cattleman of Hildebrand, Oregon, stated that in early days the Ya Whee Plateau was "open and grassy, like a park." John Neubert, father-in-law of Victor Sisson, fire control officer of Klamath Agency, who was born and raised in the Swan Lake area, substantiates the observations of Engle and Horton. He recalls that the settlers let fire creep over the forest floor and that the only time they would stop its spread was when it threatened rail fences or other improvements. Other cattlemen and loggers have testified to similar conditions in earlier days.

Early forest officers at Klamath found that the park-like condition still prevailed. They could ride their horses at will under the pines. Fire lines in the soft pumice soil were frequently constructed by dragging a manzanita bush by a saddle horse by means of a rope snubbed to the saddle horn. Several men could control a fire thousands of acres in size. The asphalt rake was adapted as the primary tool for fire control. It was still in use when the writer arrived at Klamath in 1928. Over the years thickening brush stands rendered it useless.

The last great fire, or series of fires, covered over 200,000 acres during the summer of 1918, when most able-bodied men were away at war and funds for fire suppression were lacking. This fire covered portions of the area later burned by the fire of 1959. Little is known of the 1918 fire, except that it covered most of the central portion of the reservation and that in general it did not cause excessive damage, except where it crowned through lodgepole pine stands and in the vicinity of Skellock Draw and Military Crossing. There it crowned in patches of ponderosa pine. Extensive pole stands of this species there date back to the 1918 fire.

Portions of the Klamath Forest were still open and park-like when the writer first observed it in 1928. This was particularly noticeable on areas that had been covered by the 1918 fire (Fig. 1). Over intervening years hazard has increased tremendously.

Dense stands of ponderosa pine reproduction and brush have de-

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[1]This article represents the author's views and is not to be regarded as an official expression of the attitude of the Bureau of Indian Affairs on the subject discussed.

FIG. 1.—The 1918 fire burned over this area on Calimus Butte, photographed by the writer in 1930.

FIG. 2.—Excellent pole and sapling reproduction of ponderosa and sugar pine on Solomon Butte in 1956. This area was selectively logged about 1927 or 1928 and was burned by the 1959 fire.

veloped, particularly on the extensive selectively logged areas. Severe pine beetle epidemics of the 1920's and 1930's added countless thousands of beetle deadened snags. Their partly decayed, partly resinous remains are now on the ground, lacing the reproduction and brush thickets. They burn with particularly hot flames. Intense fires also develop in the heavy mats of needles under the pole stands and particularly under the larger trees where bark scales, old cones and twigs add to the fuel. Dr. Willis W. Wagener, forest pathologist of the Pacific Southwest Forest and Range Experiment Station, has stated that the heat from burning of dense mats of needles and exfoliated bark scales is frequently sufficient to kill large sugar pines through cambium damage at the base of the tree, even though there may be no evidence of foliage scorching in the crown. Understory shrubs, above mentioned, are almost explosively hazardous.

In 1939 and again in 1940 a series of fires devastated or severely damaged almost 20,000 acres of pine and higher altitude white fir stands on the Klamath. Most of these old burns are now occupied by dense brush, with scattered and very inadequate pine reproduction. These fires proved that it is no longer possible to rapidly construct fire lines with hand tools. Heavy bulldozers are required to smash and plow through heavy brush, reproduction, and windfalls.

Within the area subsequently burned by the 1959 fire a number of fires were controlled along the railroad right-of-way. In aggregate these areas probably covered several hundred acres. In general, it should be noted, weather and moisture conditions were not such that fire danger had been serious during the period 1941-1957.

The 1959 burn includes some of the first timber sale areas of the Klamath. Logging continued from about 1916 to 1928. Most of the areas stocked to excellent reproduction. Reproduction clumps, though dense, did not evidence the growth stagnation so characteristic of other extensive areas of the ponderosa pine region. Excellent ponderosa pine pole stands developed on Cave Mountain. On Solomon Butte, at higher elevations, there developed exceedingly fast growing pole stands of mixed ponderosa and sugar pine (Fig. 2). The writer had opportunity of watching these beautiful stands develop over the years. Openings between the pole groups were choked by dense, head-high brush. Bitterbrush predominated at lower elevations, with snowbrush and manzanita higher on Solomon Butte.

The 1959 Fires

Lookouts reported a fire near the city of Chiloquin at 11:50 a.m. on September 10, 1959, while a 30- to 35-mile wind was blowing from the south. A pumper unit of the Chiloquin volunteer fire department was on the fire within minutes. The crew found a fiercely burning fire of about five acres in extent. Fire crews from Klamath Agency arrived within 20 minutes and the agency tractor and plow units were on the fire line within 30 minutes. Heavy bulldozer units also soon arrived from logging and construction operations throughout the Klamath Basin. After one of these machines became stalled the two men working with it were forced to flee from the fire through dense brush and reproduction. One of them was overtaken and killed.

Observers reported that the fire advanced an almost incredible distance of five miles in the first hour and one half. By 10 p.m. it was 11 miles long and was nearing the dry Klamath Marsh that extended northward, bordering many miles of timberland. Control was effected by the next burning period by several hundred men working with over 30 bulldozers. High winds and extreme burning conditions continued for the next several days and a number of breakovers were contained through tremendous effort.

It is estimated that approximately 85 percent of the overstory pines are killed and that the total loss will exceed 50 million feet, board measure, of merchantable timber. Sapling and pole stands are almost completely deadened (Fig. 3), except in a few unburned islands or

FIG. 3.—Ponderosa and sugar pine poles killed by the September 1959 fire on Solomon Butte. This was taken near the site of Figure 2.

spots where the fire happened to burn lightly. Salvage sales are now being conducted.

Two other fires started at noon on September 10. One fire near the Johns-Manville plant, several miles south of Chiloquin, spread into a large pole stand of pine where hazard reduction had been conducted during the previous spring under the supervision of Victor Sisson. It was controlled by men from the plant after it had caused minor foliage scorching on the pines. Sisson believes that this fire would also have escaped control had it not been for the hazard reduction and that it would have connected with the big fire burning out of control north of Chiloquin. Intervening terrain is rugged, with extremely hazardous fuel conditions. Also Chiloquin would have been squarely in the path of this fire.

Another fire, also near the Johns-Manville plant, burned northward at considerable speed through a narrow strip of pine poles between a highway and a railroad. No hazard reduction had been conducted in this stand. Though the poles were clumpy and scattered, the extremely hot ground fire from burning of dense bitterbrush and the needle and debris mats caused continual crowning in the trees and spotting ahead of the main fire. Wetting of the ground fuel ahead of the fire several times proved unavailing. Control was effected by a large crew with pumpers after the fire had advanced over one-half mile and after it had destroyed a residence.

The Prescribed Burn

The prescribed burn has already been described in detail by the writer (*5*). Therefore a brief description will here suffice.

After Klamath Agency was threatened by the Pine Ridge fire of August 1939, it was decided to apply prescribed burning for hazard reduction in dense, large pole size stands of ponderosa pine about the station. This was accomplished during November of that year. During the following winter of 1940-1941 the stand was lightly thinned and all remaining trees were pruned to 18 feet above ground. Subsequently the area has been burned annually.

The treated stand now appears like a park, with clean-boled trees and a grassy forest floor (Fig. 4). The grass consists of a fescue (*Festuca idahoensis*), Kentucky bluegrass (*Poa pratensis*) and a needle grass (*Stipa* spp.). Also present in isolated spots are giant wildrye (*Elymus condensatus*) and a rush (*Juncus* spp.). Another common plant is strawberry (*Fragaria* spp.). A few small bushes of bitterbrush still persist in the larger openings.

Ground under the pines is mantled by a thin, compressed layer of charred pine needles. The writer believes that on this area are approximated conditions that must have characterized the forest in early days, before it was overgrazed and before attempted exclusion of fire. As has been indicated, fire hazard is very low. In fact it is doubtful that a damaging wild fire can now develop under even the most extreme conditions.

Immediately outside the treated area, east of the Agency and the old Dalles-California Highway, conditions are in extreme contrast. While grasses above mentioned are present in limited quantity the ground cover is dominated by dense, highly flammable bitterbrush

FIG. 4.—Portion of prescribed burn area south of Klamath Agency. This area was first treated in November 1939. Stand improvement, including light thinning and pruning, was conducted during the winter of 1940-1941. Subsequently it has been burned annually.

FIG. 5.—Trees in this photo, east of Klamath Agency and of the old Dalles-California Highway, were pruned during the winter of 1940-1941. However, prescribed burning has never been applied. Fire hazard is high because of the dense bitterbrush and heavy needle and debris mats. Before burning treatment the area pictured in Figure 4 was characterized by similar ground cover and extremely high hazard.

(Fig. 5). Ground under the pines is also carpeted by dense mats of pine needles, twigs and old cones. Hazard is extremely high and fires, once started during dry, hazardous weather, crown up through the trees in a few minutes. Similar conditions existed on the area covered by the big 1959 fire north of Chiloquin.

The contrasting conditions above described should be obvious to all who will examine them. On one side of the highway hazard is very low; on the other very high. The only treatment that the low hazard stand has had is that of prescribed burning, light thinning and pruning. This area proves conclusively that prescribed burning can be used as a very effective fire hazard reduction tool in ponderosa pine.

As has also been previously indicated, Mr. Sisson supervised similar hazard reduction in a pole stand near the Johns-Manville plant. Had it not been for this work Sisson believes that the Johns-Manville fire of September 10 would surely have escaped control.

Discussion

According to the writer's thinking the above described areas at Klamath Agency and at Johns-Manville should stimulate wider application of prescribed burning as a hazard reduction tool. Certainly the careful effort, but low cost, required for protection of fast-growing young pine stands by this method should be justified by the high values involved. The alternatives are higher and ever higher protection budgets, then devastating fires that will continue despite our best efforts.

From our present knowledge there are sizable areas where it would be difficult to apply prescribed burning on the Klamath Reservation. We have much to learn regarding weather and fuel conditions under which it can be applied. In previous articles the writer has repeatedly urged that there be developed a methodology of prescribed burning in ponderosa pine.

It is also obvious, however, that there are sizable areas where the method should now be applied, in stands resembling those at Klamath Agency. These should be fairly well-stocked ponderosa pine stands of large pole size that have overtopped the brush. The first burning should be conducted with great care during favorable fall periods. Once the excessive hazard is reduced, reburning can be accomplished without much danger during favorable fall or spring weather. It is imperative that the reburning be repeated at intervals of several years to prevent accumulation of flammable needle mats and to keep down the brush.

If possible, stand improvement, including thinning and pruning, should also be applied in conjunction with the burning. This will result in improved quality and accelerated growth in addition to hazard reduction. It is believed that grazing by livestock should be rigidly controlled.

Summary and Conclusions

In early September of 1959, on the Klamath Indian Reservation of southern Oregon, a wild fire devastated almost 15,000 acres of ponderosa pine on areas where surface fires of comparatively light intensity used to burn at frequent intervals in earlier days. This fire killed approximately 50 million feet, board measure, of merchantable timber. It almost completely destroyed the thrifty understory stand of saplings and poles. It killed one of the fire fighters. Control of this fire required the tremendous efforts of hundreds of men, working with over 30 bulldozers.

The significant ecological changes since earlier days, that are causing recent fires to become so devastating, are continuing to manifest themselves. It is believed that more large, devastating, expensive fires will occur in the future, despite our best efforts at prevention and suppression.

In close proximity to the big burn there is a dense, large pole-sized stand of ponderosa pine where prescribed burning has been applied annually since 1939. Here clear boles of the pines rise above a clean, grassy forest floor. Hazard is so low that it is not believed possible under present conditions for a damaging wild fire to occur. This is confirmed by the ease with which a second fire was controlled after it burned into an area where similar hazard reduction had been conducted. This proves conclusively that prescribed burning can be used to reduce hazard. It should stimulate application of the burning to similar stands of pine. Particularly it should stimulate research to determine conditions under which the method may be applied on a wider scale and to develop a methodology of prescribed burning.

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Development and Use of Three Stand Volume Equations for Minnesota

Robert E. Buckman

STAND volume equations (or tables) use some characteristics of a stand, usually the product of basal area per acre (B) and height (H), to make a direct estimate of stand volume. This is in contrast to the tree volume approach, which requires measuring individual trees, followed by the calculation and summation of tree volumes to give stand volumes. Since fewer measurements and computations are required, appreciable savings in time can be made with the stand volume approach, and with little or no loss in accuracy.

The purpose of this paper is to present three stand volume equations and to illustrate briefly their development and application. Equations of this type have been made all the more useful by the rapidly expanding use of Bitterlich angle-count or point-sampling cruising. The equations developed here can be used with point-sampling methods in Minnesota, provided the same utilization and height standards are observed.

Brock (*1*), Cromer and Carron (*3*), Spurr (*7*), and others, have developed stand volume equations for certain species or utilization standards. The merchantable cubic-foot red pine equation prepared by Brock could be used in Minnesota. Likewise, several of the equations prepared by Spurr could also be used for different species or utilization standards in Minnesota.

Although originally prepared for a study of growth and yield of red pine, the equations developed here have broader application in timber inventory. In particular, two of the equations are based on the widely used Lake States composite volume tables prepared by Gevorkiantz and Olsen (*5*).

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Background

Data for this study were available from permanent sample plots contained in various experiments of the Lake States Forest Experiment Station. The experiments have various objectives and include stocking level studies, cutting methods studies, and regeneration studies. Also, some permanent inventory plots were used. Included in these experiments are the even-aged species of red pine, jack pine, and aspen. The studies are located in several areas in Minnesota, but do not include the entire range of the timber types. Nevertheless, the equations can probably be extended beyond the sample areas because the form and height structure of these even-aged stands varies but little.

The first step in developing the equations was to compute the volume for the individual plots. This could have been done in several ways: from cumulative tree-volume tally sheets, from local volume tables prepared from height-diameter curves, or from raw field data. Plot volumes were actually computed by a local volume equation method described in detail by Spurr (*8*). Essentially this involves calculating a regression equation to estimate the volume of an individual tree from the square of its diameter. A local volume equation must be prepared from sample trees for each stand. The chief advantage of the method is that it permits use of the squaring and accumulation capacities of desk calculators.

Except when raw field data are used, the important consideration for stand volume equations is that they be based on reliable underlying tree volume tables. As pointed out earlier, the cubic-foot and cordwood tables for these equations are the composite species, total height, tree volume tables (*5*) that have been used for some years in the Lake States. Since a composite total height table is not available for sawtimber, an earlier red pine table (*2*) was used. Thus, the total cubic-foot and cordwood equations are composite in the sense that they are derived from red pine, jack pine, and aspen stands. The sawtimber equation is not composite because it is based on a red pine volume table and red pine plots.

Methods of Preparation

After the per-acre cubic-foot, cordwood, or board-foot volumes (V) were computed, they were plotted against the product of their respective basal area and the average height of dominant and codominant trees (BH). From these scatter diagrams it was apparent that the regression of volume over the product of basal area and height was linear, or could be approximated by a linear relationship. For the cubic-foot graph it was also apparent that the variation increased as BH increased, and that the regression line passed through or near the origin.

All three equations were obtained by both ratio and standard linear regression techniques. This was done because the distribution of plotted points did not clearly follow all of the assumptions underlying either of the methods. This was especially so for the cordwood and board-foot equations. Both regression techniques are least-squares solutions, but the ratio method assumes (1) that the

regression line passes through the origin but not necessarily through the sample mean, and (2) that the variance of V increases as BH increases. A standard error of estimate was computed for both methods to obtain a measure of relative precision. Standard linear regression is covered in most statistical textbooks; ratio methods are discussed in Snedecor (*6*) and Deming (*4*) among others.

Stand Volume Equations

The equations by standard regression and by ratio methods, along with their respective standard errors, are given in Table 1. For the total cubic-foot volume equation, both methods provide a good fit of the regression line to the points. In fact, both solutions have nearly identical standard errors. However, the equation obtained by the ratio method is preferred because it provides a better description of the confidence bands around the regression line. It is also a little easier to use because it contains no constant. For these reasons, it is the preferred stand volume equation for cubic-foot volumes (Fig. 1).

The case is not so clear-cut for the cordwood and board-foot equations. Results using standard linear regression were slightly better than those using the ratio method. The standard regression lines have been drawn on Figure 1 along with the 95-percent confidence bands showing the reliability of individual volume predictions. However, these confidence bands do not adequately describe variation at high and low levels of BH and therefore are not shown at these extremes. Neither would confidence bands by the ratio method adequately describe variations at these extremes. In actual practice, the cordwood and board-foot volume equations would provide approximately equal results, no matter what the method of preparation.

Some of the precision in the cubic-foot stand volume equation is determined by the underlying volume table, for Gevorkiantz and Olsen (*5*) used an average *tree* form of 42 percent of the product of basal area and height. Since H for these stand volume equations is the average height of dominants and codominants, the slightly lower *stand* form of 0.4085 reflects the volume contribution of trees shorter than those dominants and codominants. Had H been the average height of all trees in the stand, the stand form factor would have been close to 0.42.

Application

Application of these equations is simply a matter of substituting stand basal area and average height of the dominant and codominant trees in the suitable regression equation. Basal areas can be determined from variable-radius plots with the Bitterlich angle gauge, from fixed-radius plots (perhaps with the aid of cumulative basal area tally sheets), or from stand tables. Height measurements are more tedious, but many improvements have been made in recent years in hypsometers. Especially useful are those hypsometers with built-in range finders.

Generally from 3 to 10 trees were measured to determine average height of dominants and codominants on each of the plots that went into the development of these equations. Most even-aged stands of aspen, red pine, and jack pine

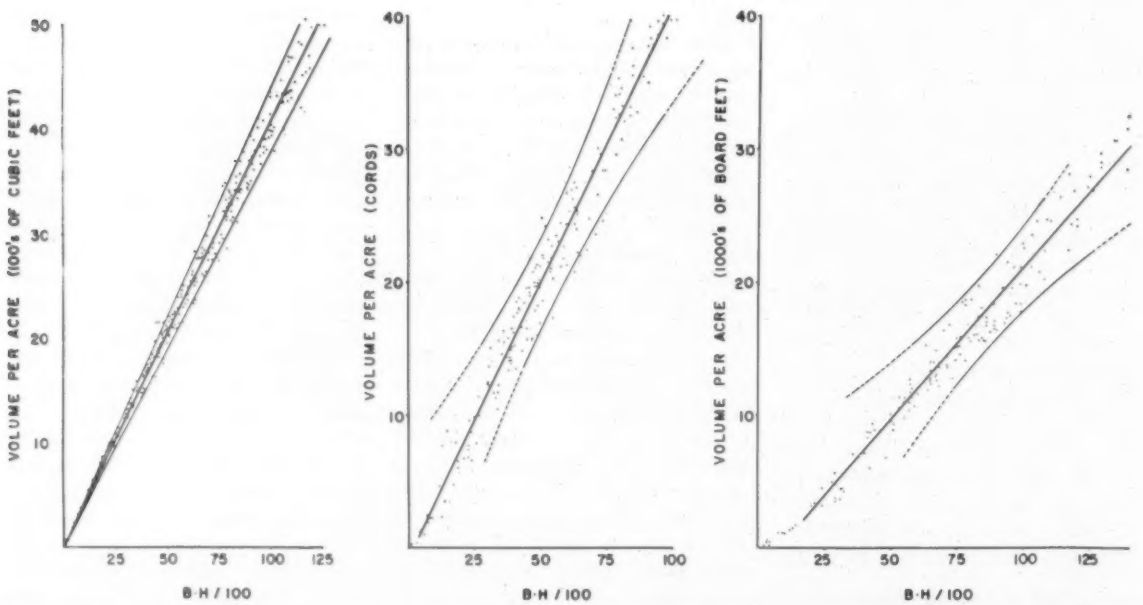

FIG. 1.—Cubic-foot, cordwood, and board-foot stand volume equations showing 95-percent confidence bands for individual predicted volumes. Cubic-foot and cordwood equations are applicable to aspen, jack pine, and red pine; the board-foot equation is for red pine only.

exhibit little variation in height of dominants and codominants within a single plot. For this reason it would seem that 3 to 5 trees should be sufficient in normal inventory work. Inaccuracies in the measurement of heights or basal areas are likely to produce compensating errors. This may result in slightly larger sampling errors, the consequences of which are that a few more plots have to be taken to attain a specified level of accuracy.

Just as the composite species *tree* volume tables have been found to be sufficiently reliable for many inventory purposes, so the composite stand volume equations should also be reliable. If a correction is required for species or local variation in form, then the procedure outlined in the composite volume table (*5*) can be followed. For stand volume equations, however, the correction must be plot by plot instead of tree by tree.

If appreciable corrections are required, if markedly different utilization standards are used, or if different height characteristics are measured (for instance average stand height or average merchantable height), one should consider developing his own stand volume equations for local use. This job is not difficult if satisfactory tree volume tables are available.

Summary

Three stand volume equations were developed for Minnesota (Table 1). These equations make a direct estimate of stand volume from the product of basal area and average height of the dominant stand. The cubic-foot and cordwood equations are composite in the sense that they can be applied to aspen, jack pine, and red pine stands. The board-foot equation can be applied only to red pine because developed solely from red pine data.

All three equations were prepared both by standard least-squares and by ratio-regression techniques. The ratio method gave the superior equation for the cubic-foot estimate while the standard method was slightly better for the cordwood and board-foot equations.

The equations should be satisfactory for many inventory purposes. However, corrections may be required for species or for variation in form. If major corrections are required, consideration should be given to developing stand volume equations for local use.

TABLE 1.—CUBIC-FOOT, CORDWOOD, AND BOARD-FOOT STAND VOLUME EQUATIONS FOR MINNESOTA[1]

Item	Method of preparation	Equation[2]	Standard error of individual volume V	Standard error as a percent of mean V	Number of plots
Cubic feet[3]	Standard	$V=15.03+0.4062\ BH$	147.9	5.45	293
	Ratio	$V=0.4085\ BH$	147.2	5.42	293
Cordwood[4]	Standard	$V=-0.907+0.004133BH$	1.805	8.77	187
	Ratio	$V=0.003958\ BH$	1.861	9.05	187
Board feet[5]	Standard	$V=-1,707+2.283\ BH$	1,502	8.38	132
	Ratio	$V=2.084\ BH$	1,616	9.02	132

[1]Cubic-foot and cordwood equations are applicable to aspen, jack pine, and red pine; the board-foot equation is for red pine only.

[2]V is volume per acre, B is basal area in square feet per acre, H is mean total height (feet) of dominants and codominants.

[3]Includes gross cubic-foot peeled volume of all stems per acre. Based on table 3, Gevorkiantz and Olsen (*5*).

[4]Includes gross cordwood volume in rough cords of all stems per acre 3.6 inches d.b.h. and larger to a variable top d.i.b. of not less than 3.0 inches. Based on Table 5, Gevorkiantz and Olsen (*5*).

[5]Includes red pine gross board-foot volume per acre, Scribner Decimal C rule, all trees 7.6 inches d.b.h. and larger to a 6.0-inch top d.i.b. Based on table 108, Brown and Gevorkiantz (*2*).

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Effect of Nursery Bed Density on Loblolly and Slash Pine Seedlings

Eugene Shoulders

THE DENSITY at which southern pine seedlings are grown in nurseries influences their morphological quality (*2, 3, 4*) and their ability to survive after outplanting. Wakeley (*6*) says that loblolly pine (*Pinus taeda* L.) should be grown at densities no greater than 50 to 55 seedlings per square foot and suggests that densities of about 30 per square foot are optimum for slash (*P. elliottii* Engelm.) and longleaf pine (*P. palustris* Mill.). Derr (*1*) and Scarbrough and Allen (*5*) showed that longleaf grown at lower densities survive better and initiate height growth sooner than those grown at 30 per square foot.

These results prompted new studies with loblolly and slash pine, to learn if densities lower than those recommended by Wakeley would improve seedling quality or field survival.

In these new studies, densities of 40 per square foot, or slightly higher, produced the greatest number of field-established trees per square foot of nursery bed, but seedlings grown at lower densities were larger and survived better.

Study Methods

Data were collected over a four-year period in three studies. Seedlings for two studies were grown in a small experimental nursery on the Alexander State Forest near Alexandria, Louisiana. Seedlings for the third study were produced in Louisiana Forestry Commission nurseries near Oberlin and Sibley.

The intention was to test 4 densities—10, 20, 30, and 40 seedlings per square foot—in all studies. To this end an excess of seed was sown and the beds were thinned after germination was complete. In thinning, about 10 percent more than the prescribed number of seedlings were retained to allow for later mortality. This allowance was generally more than adequate, and consequently the final densities did not agree exactly with those desired (Table 1).

Except for the thinning, the experimental beds received no special care. Soils were not fumigated for control of nematodes or root rots, nor were evidences of these pathogens observed.

All studies had similar nursery designs, consisting of three block replications of each species. In Tests 1 and 2, seedlings from the replications of each density were composited and six replicates of each density were planted. The basic nursery design was preserved in field plantings in Test 3. Plots in the nurseries varied in size from 3½ to 10 linear feet of nursery bed.

Total production per square foot was determined by counting the number of seedlings on all or a portion of each plot. Samples of seedlings were lifted and sorted and the proportions of plantable and cull seedlings recorded. Morphological grade 1 and 2 seedlings (*6*, p. 103) were considered plantable, while grade 3 seedlings were dis-

TABLE 1.—EFFECT OF NURSERY BED DENSITY ON SEEDLING YIELD BY GRADES AND SIZE OF PLANTABLE SEEDLINGS

Test	Total	Production by morphological grade				Size of plantable seedlings	
no.	production	Grade 1	Grade 2	Grade 3	Proportion plantable	Root collar diameter	Height
	Seedlings per square foot				*Percent*	*Inch*	*Inches*
				Slash pine			
1	11.3	10.5	0.5	0.3	97	9/32	10
	21.9	15.6	4.8	1.5	93	7/32	9
	32.1	18.6	8.6	4.9	85	6/32	10
	41.9	20.0	9.2	12.7	70	6/32	10
2	13.8	9.6	3.7	.5	97	7/32	10
	23.2	14.1	6.5	2.6	89	6/32	11
	33.8	6.8	16.9	10.1	70	5/32	10
	44.9	3.6	26.1	15.2	66	4/32	10
3-A	10.8	8.9	1.1	.8	94	10/32	7
	21.8	16.5	3.3	2.0	91	8/32	8
	31.6	19.6	8.2	3.8	88	6/32	7
	42.1	19.4	13.1	9.6	77	6/32	8
3-B	12.0	9.9	1.4	.7	95	8/32	7
	22.1	14.4	5.6	2.1	90	7/32	7
	32.7	18.2	9.8	4.7	86	6/32	7
	38.1	15.2	14.1	8.8	77	6/32	8
				Loblolly pine			
2	14.4	10.8	2.8	.8	94	7/32	10
	23.8	14.2	4.5	5.1	79	6/32	10
	37.9	7.6	16.4	13.9	63	5/32	8
	48.9	11.2	14.6	23.1	53	5/32	8
3-A	13.4	11.9	.3	1.2	91	8/32	7
	21.6	14.3	5.4	1.9	91	6/32	7
	35.1	13.7	12.6	8.8	75	6/32	7
	43.8	8.3	21.5	14.0	68	5/32	7
3-B	11.8	11.5	.0	.3	97	8/32	11
	21.2	16.0	3.9	1.3	93	7/32	10
	30.9	18.5	8.3	4.1	87	6/32	11
	39.3	17.3	13.8	8.2	79	6/32	11

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carded as cull. Diseased and mechanically injured stock was graded as though it was sound and then discarded. Part of the plantable stock was measured to determine the effect of density on seedling size and on the yield of morphological grade 1 and 2 seedlings.

In Test 1, no data were taken on grade yields of loblolly pine. Designs of the other studies were altered somewhat by mishaps in the nurseries. In Test 2, it was necessary to discard two complete replications of loblolly pine, and results are based on unreplicated plots in the nursery. In Test 3, accidental root-pruning forced the dropping of 3 loblolly and 4 slash pine plots.

Field plantings were on open cutover longleaf lands in central Louisiana. Plots were rows of 25 trees. Test 1 was restricted to a single site. Tests 2 and 3 were planted on both good and poor sites except that loblolly was not included on the good site in Test 2. The identities of individual studies and nurseries are preserved in this presentation, but data from both types of site are combined, as site quality did not influence relative performance of the various densities.

Yield and Grade of Nursery Stock

The highest density (nominally 40 per square foot) produced the largest number of plantable seedlings of both species; the range was from 29 to 32 for slash and 26 to 31 for loblolly (Table 1). It also produced the most culls, and usually had the smallest percentage of grade 1 seedlings. In these plots, every third or fourth seedling was too small to plant and less than 50 percent of the total production was grade 1. In contrast, more than 90 percent of the seedlings raised at a density of 10 were plantable, and over 70 percent were grade 1.

Because of these facts, actual gains in number of plantables decreased sharply with each increase in density (Fig. 1). On the average, 8.8 more plantable slash pines and 7.0 more loblolly were produced at a density of 20 per square foot than at a density of 10. Increases from 30 to 40 seedlings per square foot produced only 3.5 additional slash and 3.2 additional loblolly pines. A projection of this trend indicates that increases beyond 40 per square foot would bring little net gain in plantable seedlings.

Root collar diameters decreased as bed densities increased, but heights were unaffected (Table 1 and Fig. 2). At a density of 10, plantable seedlings averaged 7/32 to 10/32 inch in root collar diameter while those grown at approximately 40 per square foot were 4/32 to 6/32 inch in root collar diameter.

Both species responded similarly to change in density. Variations in yield of plantable seedlings and in size of planting stock between and within species in different tests were probably due to weather, or to variations in soil fertility. The study beds were fertilized according to normal nursery practices.

Survival

In moderately dry years, the best field survival of both species was from trees grown in low-density beds. When rainfall was adequate, nursery-bed density had no appreciable effect on survival.

In Test 1, summer rainfall was below normal, and differences in

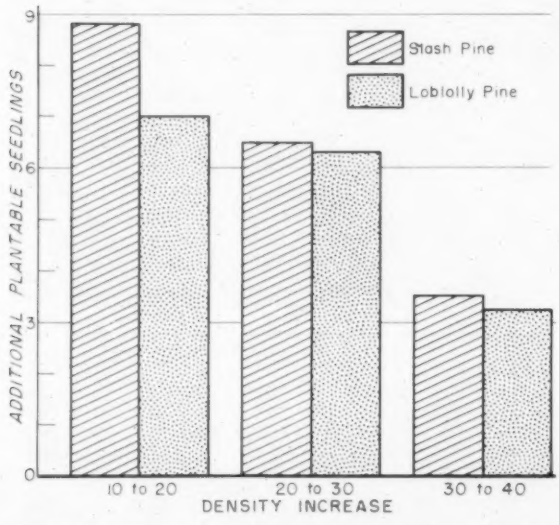

FIG. 1.—Increases in yields of plantable seedlings associated with increases in nursery bed density. All values are in terms of seedlings per square foot of nursery bed.

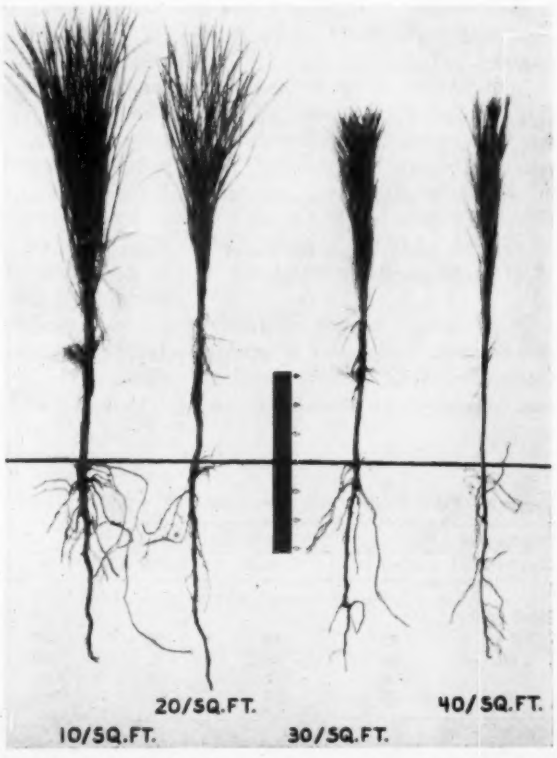

FIG. 2.—Typical plantable slash pine seedlings from Test 2. Those from beds of low density were stoutest and had the longest needles. Heights from root collar to base of terminal bud were not affected.

survival between seedlings from the low and the high bed densities were 16 percentage points for slash and 9 for loblolly (Table 2). For densities of 30 and 40, survival was the same with both species. Summer rainfall was also deficient in Test 2, and trends were the same as in Test 1. There was no evident cause for the relatively poor survival of all slash seedlings in this test, nor for the fact that those grown at a density of 30 fared less poorly than the others. In Test 3, when rainfall was adequate and well distributed, survival was uniformly high for all densities, averaging 90 percent or more.

The results of the three tests in successive years suggest that densities in the range studied are important to field survival only in dry years. Even then, a marked improvement in survival might require impractically low nursery stocking.

Effective Seedlings

Only seedlings that pass the grading table and survive in the field are of value to the planter. These trees, or effective seedlings, are a good measure of the total effect of nursery bed density.

In these studies the highest density produced the most effective seedlings, even though each successive increase in density produced fewer additional effectives (Table 3). Nominal bed density of 40 yielded 1.6 to 3.1 times as many effective seedlings as a density of 10.

The economic impact of density can be visualized better if square-foot bed yields of effective seedlings are converted to acreage values. These conversions were made for slash in Test 1, for loblolly in Test 2, and for both species in Test 3, using a factor of 28,000 square feet of nursery bed per gross acre of nursery. Loblolly from Test 1 was not used because yields of effectives could not be determined. Slash from Test 2 was excluded because of the atypical survival of seedlings from the 30-density beds. Despite the omissions, however, the comparisons of densities are conservative.

When slash seedlings were planted in a droughty year, the 40 density yielded 45,000 more effective seedlings per acre of nursery than the 30 density, 148,000 more than the 20, and 339,000 more than the 10. Comparable values for loblolly pine are 39,000, 137,000 and 218,000, respectively.

When planting was in a year of ample, well-distributed summer rains, yields of effective seedlings were greater and the advantage of higher densities was more pronounced. For slash pine, the estimated yield of effective seedlings from the 40 density averaged 819,000 per acre. This yield was 113,000, 298,000 and 528,000 greater than that from the 30, 20, and 10 square-foot densities, respectively. The average yield of effective loblolly seedlings from the 40-density beds was 826,000 seedlings per acre. Reducing density to 30 per square foot reduced the yield 97,000 seedlings per acre. Further reductions in density to 20 and 10 seedlings per square foot reduced yields of effective seedlings by 279,000 and 494,000 seedlings per acre, respectively.

Densities of 10 or 20 were clearly too low for efficient production of loblolly and slash pine stock. Densities of 30 to 40 per square foot utilized nursery space more completely and yielded more effective seedlings.

Assuming that seedlings should be grown for outplanting in adverse years, was the density of 40 more efficient than 30? The only additional expenses associated with the extra effective seedlings from the denser beds were those for seed and for the labor of lifting and grading, and the densities may be compared on this basis.

With average numbers of seed per pound and a tree percent of 70, 28 pounds of slash seed and 22 of loblolly are required to increase bed density from 30 to 40. If slash seed costs $3 per pound and loblolly $4, the extra seed amounts to $84 and $88 per acre, respectively. Lifting and grading costs about $0.50 per thousand for bed-run seedlings and it was necessary to handle an additional 274,000 slash seedlings per acre and 308,000 loblolly to realize the increases in effectives. Thus, the extra effective seedlings cost about $5.50 per thousand ($6.20 for loblolly and $4.90 for slash). As each thousand effectives represented about 1.3 thousand plantable seedlings, the investment per thousand plantables was about $4.25. Densities of 40 per square foot therefore appear well justified, for few if any southern nurseries are producing plantable seedlings for less than $4.25 per thousand.

Summary

Three studies in central Louisiana measured the effects of nurs-

TABLE 2.—FIRST-YEAR SURVIVAL OF LOBLOLLY AND SLASH PINES

Species and density class	First-year survival			
	Test 1	Test 2	Test 3-A	Test 3-B
	Percent			
Slash pine				
10	92	43	98	97
20	83	38	92	95
30	76	51	90	90
40	76	33	93	96
Loblolly pine				
10	91	89	100	100
20	86	80	100	99
30	82	77	97	99
40	82	77	96	98

TABLE 3.—PRODUCTION OF EFFECTIVE SEEDLINGS PER SQUARE FOOT OF NURSERY BED

Species and density class	Effective seedlings			
	Test 1	Test 2	Test 3-A	Test 3-B
	Number			
Slash pine				
10	10.1	5.7	9.8	11.0
20	16.9	7.8	18.2	19.0
30	20.6	12.1	25.2	25.2
40	22.2	9.8	30.3	28.2
Loblolly pine				
10	----	12.1	12.2	11.5
20	----	15.0	19.7	19.4
30	----	18.5	25.6	26.5
40	----	19.9	28.6	30.4

ery bed densities of approximately 10, 20, 30, and 40 per square foot on slash and loblolly pine seedlings.

Production of plantable and effective seedlings increased as nursery bed density was raised, and the nominal 40 density produced the greatest numbers of these seedlings. Seedlings from low-density beds were larger in root collar diameter but about the same height as stock from denser beds. In dry years, stock from low-density beds survived best. Both morphological quality of plantable seedlings and field survival decreased as density was increased. All factors considered, the 40 density was more efficient than lower densities for producing loblolly and slash pine seedlings. While higher densities were not tested, data indicated there would be little or no gain in growing seedlings at greater nursery-bed stocking.

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IN RECOGNITION of his contributions to the profession of forestry retiring JOURNAL advertising representative Lloyd Thorpe (right) was made an honorary member of the University of Washington Foresters Alumni Association on May 27. He is shown receiving his certificate of membership from alumni president Edwin Loners at the Pack Demonstration Forest, LaGrande, Wash.

Thorpe, who retired in July and was then planning a trip around the world, has received numerous tributes from his many friends and associates for his services to the JOURNAL, including formal congratulations and expressions of appreciation from the Executive Committees of both the Puget Sound and Columbia River Sections and the Council of the SAF.

Profits and Risks in the Lumber Industry

George A. Craig

SINCE forestry's future in the United States will be influenced by the profit position of the lumber industry (*2, 16*), a detailed examination of profits is justified. With an appreciation of how well our industry is prospering compared to others, we can better anticipate what forestry and foresters may contribute to society and, incidentally, how society may value our services as foresters.

Such knowledge would appear to be essential to the development of sound forestry policy and an important consideration in forestry practices. Unfortunately, there appears to have been little research done in this field. Nearly 25 years ago, Alexis N. Garin of the Yale School of Forestry noted this when he observed in the JOURNAL:

> It is an anomaly that public funds have been granted for research in practically every field except that related to the actual financial conditions of the private operators; yet foresters talk about "planned forestry," "controlled liquidation," and "the adjustment of supply to demand" as if these phrases have some significant meaning by themselves and need not be related to business reality (*8*).

As far as I can determine, there have been no JOURNAL articles primarily devoted to profits since Garin expressed his concern.

What Are Profits?

The word "profits" is defined variously and expressed in different ways. Henry George wrote that there is no such thing (*9*), that profits can be divided into wages, rent, and interest. My dictionary gives the meaning as "the share of the employing classes in the distribution of the products of industry, as distinct from wages and rent."

Because much of the data that follow are based on corporate income tax statements, it is possible to treat the wages of management as a part of cost. For our purposes, we will generally consider profits to be the difference between gross income and actual or contractual expenses (including cost of management) involved in the production of the income. Profits, as used here, are the return for the use of land, money, capital goods, and consumer goods necessary to the business. Included is a payment for bearing risk.

Profits generally are expressed as a percentage of the value of total sales made during the time that they are accumulated or as a percentage of the "capital" or value of economic goods required to produce them. These ratios may be developed before or after the payment of income taxes.

In its timber appraisal system, the U. S. Forest Service expresses the profit allowance as a percentage of all costs including stumpage but excluding income taxes and interest payments for borrowed money. In the mechanics of the appraisal, Forest Service timber appraisers often convert the "profit ratio," based on costs, to a ratio based on the anticipated value of the lumber to be produced. The use of cost or sales ratios is justified because of the great difficulty in attempting to determine the capital investment necessary to the harvest and processing of each timber offering.

We Must Relate Profits to Capital

However, to evaluate profits properly we must get back to their relationship to investment. Generally, people invest their money in an enterprise because they anticipate that the enterprise will be profitable and that they will share in the profits. They do not care if the firm's profits are 5 percent or 10 percent of sales or of costs. They want to know the rate of return on the money they invest. Under some circumstances, firms with a 5 percent return on sales will yield a greater return to the investor than will firms realizing a 10 percent return on sales. The return to the investor will vary with the rate at which his capital is "turned over" or used by the enterprise.

Various data concerning the periodic annual rates of capital turnover are given in Table 1. They show that industry generally has speeded its rate of capital use. (Another article could be written on the developments in the lumber industry which have brought this change.) However, lumber and its major competitor consistently lag behind the all-manufacturing rate. Therefore, profits as a percentage of sales value would have to be higher for these industries if they were to equal the all-manufacturing return on invested capital.

When we compare industries or large segments of industries we eliminate some of the problems encountered in the use of invested capital as the base for profit allowances in individual timber sales. It would appear reasonable to assume that in comparisons on a common time base, between large numbers of firms in different industries, the distortions of individual accounting practices will largely be smoothed out and the effects of inflation or deflation of invested money values will be common to the industries being compared. At least, there seems to be no reason for suspecting that the lumber industry book values are too high.

For these reasons, most of the

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following data are profits as a percent of capital invested.

Finally, we have the question of comparing profits before or after income taxes. Again, the investor is interested in his return, which usually is after corporate income taxes. However, we have some difficulty here with the wood products industry because of the differences between firms as to their ability to treat part of their income as capital gains.

The Internal Revenue Code permits a lower tax rate on the share of income that is the result of the increase in the value of timber from the time that it was acquired. This is to accord the same treatment for capital that is invested in timber as is accorded to other capital investments. Obviously, the tax payments will vary widely between firms, depending on the time and price at which they acquired their timber and whether or not they qualify for the capital gains treatment.

When we remember that tax laws have changed and that it is profits on the *manufacture* of wood products which will determine the demand for standing timber and the gains to timber owners, it is logical to conclude that our comparisons should be made before allowances for income taxes—recognizing that such profits are cut in half by corporate taxes where there is no capital gain.

Incidentally, as noted above, the largest seller of timber in the United States, the Forest Service, uses before-taxes profit allowances in its timber appraisals.

Profits Direct Business Traffic

Perhaps we should remind ourselves that in every year there are many firms with net losses while others realize net profits. Every year thousands of businesses fail, including some in the most profitable industries, and new firms come into existence. For going concerns, investments are made to increase production or to reduce costs in some instances, while capital may be withdrawn from others.

Profits—missing, realized, or anticipated—are the stop, go and caution signals for these business changes. Ideally, the differences between costs and prices direct the flow of investment capital and shift rates of production. Profits are the essential governor for our business machine, the machine which has produced our high standard of well-being.

Forty Years of Profits and Losses

Public expression of preference through the payment of profits has not been encouraging or flattering to our industry. In 32 of the past 41 years the lumber and wood industry[1] had an average profit rate that was lower than that for all-manufacturing. Since 1924, the industry has had only four better than average years. These observations are based on an analysis of the composite balance sheets reported for thousands of corporations by the Bureau of Internal Revenue since 1931 (*25*), data from the Federal Trade Commission and the Securities and Exchange Commission (*24*), The Conference Board (*11*), and a comprehensive study of the 1919-1928 period by Professor Ralph C. Epstein (*6*).

To give a further measure of our industry's position, a comparison was made with the profit rate for our principal competitor in the building materials field—stone, clay, and glass products manufacture. This industry makes the concrete and gypsum products, brick, ceramic wall and floor tile, cement, flat glass, and other stone, clay, and sand products. Our competitor apparently did better than the all-industry average in 24 of the 39 years for which we have data between 1919 and 1959.

During the past 40 years (1919-1920 compared to the most recent five years) average profit rates for all-manufacturing and stone, clay, and glass products manufacture have about doubled while the rate for lumber manufacture has dropped substantially. Based on "Statistics of Income" data, the weighted average profit rate for all manufacturing in the 1932-1958 period was 16.16 percent. For stone, clay and glass products the figure was 16.78 percent, compared to 10.03 percent for lumber and wood products manufacture. Other data are given in Table 1.

As to be expected, the two industries have each had a wider year-to-year fluctuation in profit rates than was experienced by the average for total manufacturing (Fig. 1). This will be discussed in some detail later in reviewing the question of risk.

Corporate Reports Give Good Samples

These observations are based on large samples. The data for total corporate manufacturing in the 1950's came from more than 115,000 statements each year. For lumber and wood products, the annual total of statements was more than 5,500, and stone, clay, and glass products returns exceeded 4,000 annually in the past decade. Professor Epstein had smaller samples, stratified by size.

The corporate form of business accounts for most production, sales, and profits in manufacturing. Data from The Conference Board, the Department of Commerce, and the Treasury Department were compared and revealed that 92 percent of the capital invested in all manufacturing enterprises in the 1949-1956 period was in corporations. For lumber and wood products the comparable figure was 80 percent and for stone, clay, and glass products manufacture, 96 percent.

Other forms of business ownership include, of course, partnerships and individual proprietorships. The Bureau of Internal Revenue compiled partnership and sole proprietorship data in some recent years. There were 63,144 manufacturing partnerships in 1953 (*27*). Of these, lumber and wood products partnerships totaled 14,290, and there were 2,899 stone, clay, and glass products partnerships. At the same time there was a total of 171,669 manufacturing

[1] From 1938 to the present the data on lumber and wood products exclude furniture. This is also true of 1919-1928 data. From 1948 to present this classification includes logging camps, logging contractors, sawmills and planing mills, millwork, veneer, plywood and prefabricated structural wood products, wooden containers, and other finished lumber products, except window and door screens, shades and venetian blinds, partitions, shelving, lockers, office and store fixtures tabulated under the furniture classification (*7*). In 1938-1947, wooden containers were not included.

TABLE 1.—BEFORE-TAXES PROFITS TO INVESTED CAPITAL
MANUFACTURING CORPORATIONS
(Fiscal years include the 12 months starting with July in prior calendar year)

Year	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	Weighted average	Weighted average annual rate capital turn
All manufacturing (2,046, large, identical firms)	11.5	7.9	3.1	9.9	9.8	8.9	10.0	10.1	8.3	9.7	9.1	1.187
Stone, clay & glass (114, large, identical firms)	5.5	13.1	7.9	14.4	18.9	16.5	16.9	16.8	15.0	16.2	15.4	1.062
Lumber & wood products[1] (135, large, identical firms)	17.4	17.0	4.0	13.2	16.7	12.4	11.7	10.9	6.3	15.9	11.4	1.009
Lumber manufacture (64, large, identical firms)	16.0	17.7	2.5	10.2	15.8	9.0	8.8	9.4	5.4	6.8	10.0	0.651
Lumber manufacture (81 to 91, small, nonidentical)	15.1	12.4	5.7	6.4	11.7	10.5	8.5	8.3	10.1	10.0	9.9[2]	1.471[2]

Source: Epstein, R. C. Industrial Profits in the United States. 1934. [1]Except furniture. [2]Arithmetic average.

Fiscal year	1932	1933	1934	1935	1936	1937	1938				Weighted average	Capital turnover
Total manufacturing	—0.6	—3.2	1.1	3.5	6.3	9.0	8.5				3.3	0.980
Stone, clay & glass products	—1.6	—5.6	—1.0	2.1	4.6	8.6	8.6				2.2	0.603
Forest products[3]	—7.5	—9.0	—3.2	—2.4	—0.4	3.2	3.8				—2.6	0.639

Source: Bureau of Internal Revenue. Statistics of Income.
[3]Sawmill and planing mill products, other wood products, carriages, wagons, furniture, baskets, etc.

Fiscal year	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	Weighted average	Capital turnover
Total manufacturing	3.7	8.1	11.6	20.7	24.1	26.6	23.1	15.6	17.3	21.2	18.0	1.881
Stone, clay & glass products	4.1	8.8	11.8	19.3	21.6	17.8	14.8	12.2	18.8	20.9	15.3	1.253
Lumber & timber basic products[4]	—0.7	1.5	5.3	13.8	16.4	14.5	13.0	9.8	20.3	32.1	13.3	1.240

Source: Bureau of Internal Revenue. Statistics of Income.
[4]Logging and sawmills, planing mills, lumber and timber basic products not allocable. Excludes furniture, partitions and fixtures, wooden containers, matches, cork products.

Fiscal year	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Weighted average	Capital turnover
Total manufacturing	21.1	15.7	24.0	23.3	18.3	18.5	15.3	19.7	17.6	15.5	18.7	2.210
Stone, clay & glass products	22.5	20.2	29.8	26.9	20.4	20.9	20.1	26.2	20.7	16.9	21.8	1.671
Lumber & wood products[5]	25.7	12.3	26.2	20.0	13.5	11.0	12.3	17.3	11.2	6.4	15.1	1.932

Source: Bureau of Internal Revenue. Statistics of Income.
[5]Logging camps and logging contractors; sawmills and planing mills, millwork, veneer, plywood, and prefabricated structural products; wooden containers; and miscellaneous wood products. Excludes furniture.

Calendar year	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	Weighted average	Capital turnover
All manufacturing	27.8	28.5	22.1	22.6	23.8	23.8	22.6	20.0	15.4	18.9	22.0	2.284
Stone, clay & glass products	32.9	33.2	25.5	26.1	23.6	30.3	28.5	23.1	19.0	23.6	25.8	1.725
Lumber & wood products[6]	29.4	25.7	15.2	12.7	11.6	19.3	15.0	8.8	10.4	16.1	15.7	2.025

Source: Federal Trade Commission, Securities & Exchange Commission. Quarterly Financial Report for Manufacturing Corporations.
[6]Same definition as above.

sole proprietorships, of which 46,873 were in lumber and wood products and 7,243 in stone, clay, and glass products manufacture (*28*).

However, partnerships and sole proprietorships were relatively of little importance in the volume of business done. On the gross sales of corporations combined with "gross receipts" of partnerships and proprietorships, corporations did 95 percent of the combined manufacturing in 1953. For lumber and wood products the figure was 65 percent and for stone, clay, and glass products manufacture, 97 percent in that year. By fiscal year 1957-1958 the number of individual proprietorships in all-manufacturing had decreased slightly, while those in lumber and wood products increased to 54,556 (*29*). At the same time the corporate share of lumber and wood total receipts increased to 71 percent.

Thus, it would appear that for our purposes of comparing profit experience in manufacturing we can rely heavily on the corporate data.

The 1953 report on partnerships had data from 37,309 balance sheets (*27*), which showed "ordinary net income"[2] equivalent to 36 percent of "capital accounts"[3] for total partnership manufacturing. The comparable figure for 5,073 lumber and wood products

[2]"Ordinary net income (or deficit) is the net income (or deficit) of the partnership exclusive of capital gains and losses and the deduction for contributions, and is the excess of total receipts over total deductions, or the excess of total deductions over total receipts, respectively" (*26*).

[3]Comparable to capital stock, surplus and reserves that is invested capital of corporations.

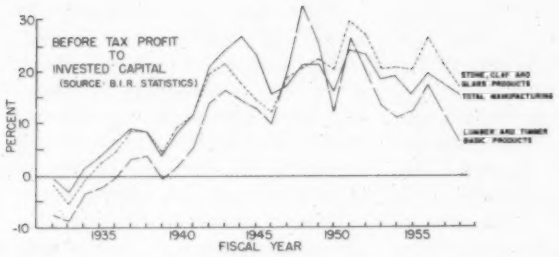

FIG. 1.—Lumber and wood products profits rates were below those for total manufacturing in 23 years during a 27-year span. See definition of lumber group in footnote, Table 1.

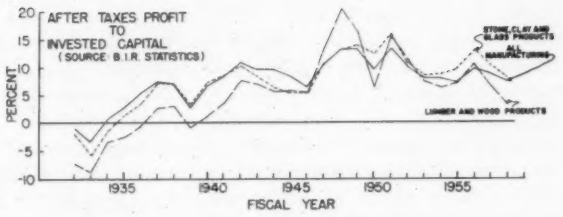

FIG. 2.—With capital gains supplementing meager ordinary net income in the last half of the period, lumber and wood products after-tax profits were still below the all-manufacturing average in 21 of the 27 years shown.

balance sheets was 13 percent and for 1,871 stone, clay, and glass products records, 52 percent. Of course, taxes on partnership incomes are paid at different rates than the 52 percent paid by most corporations.

The proprietorship data showed the 1953 net profit to total receipts to be 9.3 percent for all manufacturing, 11.4 percent for stone, clay, and glass, and 7.0 percent for lumber and wood. In fiscal year 1957-1958 the relationships were about the same, except that stone, clay, and glass, with an even smaller share of its manufacture by this form of ownership, had some decrease. However, it was still above the rate for lumber.

Why the Differences?

Theoretically, the persistent differences in profit rates are unexpected. We should be able to expect any manufacturing industry over a long period of time to closely approach the average profit rate for all manufacturing. Low earning rates should have caused some withdrawal of capital, reduced production, improved market price, and eventually brought the lumber industry's profit position up to that of all manufacturing. Stone, clay, and glass products manufacture seems to have followed the classical pattern and closely matched the all-manufacturing average over the long term.

Since the income tax statements treat management wages as a part of cost and since enlarged salaries could be a way to make "profit" payments to officers, a look was taken at the salaries listed in the composite statements for the industries. Using data from the reports of the most recent five years available (July 1953-June 1958), it was found that on the average the compensation to officers in all manufacturing amounted to 2.61 percent of invested capital annually. For stone, clay, and glass products manufacture the average was 2.66 percent, and for lumber and wood products the average was 3.76 percent.

However, this 1.1 percent difference compares to much larger differences in profit rates. For the same period the all-manufacturing average profit rate was 17.3 percent, and stone, clay, and glass products realized 20.8 percent. Lumber and wood products averaged an 11.5 percent return, according to the tax reports.

The difference in officers' compensation might be explained by the fact that the average lumber corporation has less than half as much capital invested as does either the all-manufacturing average firm or stone, clay, and glass products manufacturer. With twice as many organizations per billion dollars of investment, the cost of such overhead could be expected to be greater.

Profits Related to Size of Firm

Of course, the use of averages can be misleading, and some stratification of the data is helpful in arriving at a better understanding of the relationships. Professor Epstein found that "the larger manufacturing enterprises, in the main, do not earn profits at higher rates than the smaller ones" (*6*). Another study of the 1920's confirmed this (*15*). However, Table 2 shows the recent relationship of the size of firms to profits, according to an annual average of 123,457 manufacturing firms' balance sheets, 5,990 of which were for lumber and wood products and 4,391 for stone, clay, and glass products.

It is evident that, on the average,

TABLE 2.—PROFITS BY ASSET GROUPS, JUNE 1953 TO JULY 1958
(All figures are percentages)

Total assets group	Share of corporations in the industry			Average profit rate			Share of industry's profits		
	Total mfg.	Lbr. & wood	Stone, clay, glass	Total mfg.	Lbr. & wood	Stone, clay, glass	Total mfg.	Lbr. & wood	Stone, clay, glass
Under $100,000	48.9	42.8	40.6	−1.47	−7.56	0.84	−0.07	−1.04	0.03
$100,000 under $250,000	21.1	23.9	25.0	9.04	5.94	9.36	0.92	2.21	1.01
$250,000 under $1,000,000	19.3	23.1	22.8	13.27	9.65	13.89	4.06	10.93	4.75
$1,000,000 under $10,000,000	9.1	9.4	9.6	16.28	11.39	18.63	14.81	33.80	17.95
$10,000,000 and over	1.6	0.8	1.9	18.18	13.52	23.23	80.28	54.10	76.26
Total	100.0	100.0	99.9	17.31	11.61	21.12	100.0	100.0	100.0

Source: Bureau of Internal Revenue. Statistics of Income.

profit rates and the total share of profits increase with assets. Further, lumber and wood products manufacture appears to have substantially smaller than average profit rates for all asset groups. Among the corporate firms, both of the competing industries have a little smaller share of their producers in the under-$250,000-assets group than the average for all-manufacturing. In all cases, these smaller firms account for only about 1 percent of the industry's total net profits. Lumber has a larger share of its firms in the $250,000-to-$1,000,000-assets group, and it yields nearly 11 percent of the industry's profits, more than double that for all-manufacturing and stone, clay, and glass products.

Nearly all of the net profits come from firms with assets over $1,000,000. Not only does lumber and wood products have relatively fewer firms in this class, but the industry is even further behind in the $10,000,000 and over group.

Why Do Low-Profit Industries Continue?

Ease of entry and shortsightedness must rate high among the reasons for the industry's problems. Professor Epstein noted that some industries appear to be consistently low or high in the profit picture. He observed that there is no "correct" rate of return (*6*). However, individual investors no doubt consider that they should receive at least as much or a little more than that yielded to other investors. This is evident in the preferences shown for certain types of investment.

Corporate dividends (paid as cash and assets other than the corporation's stock) are reported in "Statistics of Income" (*25*). For the July 1953-June 1958 period they amounted to 5.0 percent of invested capital for total manufacturing. For stone, clay, and glass products manufacture the yield was 5.4 percent and for lumber and wood products only 3 percent. A comparison of corporate invested capital in balance sheets reported to the Bureau of Internal Revenue shows that total investment in total manufacturing over this period of five years averaged a 5 percent increase compared to 8 percent for stone, clay, and glass products, and 3 percent for lumber.

The unusually high rate of new establishments in lumber manufacture is noted in Table 6. That young corporations are more liable to suffer deficits than older corporations has been documented by Professor Crum (*4*).

"Many enterprises that do not earn returns at rates that accord with expectations of their owners still continue in business," wrote Professor Epstein, "for a smaller return is better than none at all; were production entirely abandoned, all fixed capital investment of a specialized character might be completly lost. In extreme cases, operations may be continued for considerable periods even though the product is sold at an absolute loss, if prices that repay something more than prime costs (direct labor and material) are realized" (*6*).

Few very large enterprises that fail to earn profits for several years really go out of business entirely; they merge, reorganize or continue an independent existence but alter the character of their production by shifting to new products and activities. It often is a long time before an unsuccessful corporation gives up entirely (*6*).

Industry Action a Sum of Individual Decisions

In the past, many industries with declining profit rates have increased invested capital at a faster rate than sales increased. In some instances, managers have not been aware of the general rate of return in the industry. Even when general conditions are known, the managers of individual corporations, motivated by a belief that their firms will be successful under adverse conditions, go ahead with expansion activities (*6*).

The *expectation* of profit governs the amounts of various goods and services offered to our society.

Many closed corporations are similar to some partnerships in that their owners earn a good living with small-scale production which may justify no net income reports for corporate tax purposes (*6*).

Additionally, investors are "human" and do not always act logically. Some actually invest or continue their investments in lumber and wood products manufacture because they have a sentimental adtachment for the industry or because "it is all they know."

One explanation for the continuation of much of the industry is the tax treatment of capital gains on timber. This permits a near "normal" return to firms which liquidate a capital asset—timber (Fig. 2). However, it has been of little value to those who purchase timber on a short-term basis, such as firms dependent on public timber. This question is examined in more detail later.

Finally, many firms do not continue, as shown by the failure record cited below.

Risk as a Consideration

Perhaps lumber manufacture is particularly attractive to some investors because of the risk. Everything is sweetened by risk, we are told. The riskiness of the lumber business has been long, if not widely, recognized. Adam Smith in 1776 observed that the great profits sometimes made in risky businesses, such as smuggling and the lumber trade, are really but the compensations for risk, which, in the long run, reduce the returns to capital so used to the ordinary, or below the ordinary, rate (*9*).

"The over-weening conceit which the greater part of men have of their abilities, is an ancient evil remarked by the philosophers and moralists of all ages. Their absurd presumption in their own good fortune has been less taken notice of. It is, however, if possible, still more universal," Adam Smith declared (*11*).

Professor F. H. Knight found that "risk" is really of two types. One of these is of the nature of a known chance or probability which, at least theoretically, could be avoided by the payment of a small fixed cost for insurance. The other kind of uncertainty is that which is not measurable and therefore not susceptible to elimination. It, for example, results from making judgments as to the future course of events (*10*).

The assertion has been made (*6*) that over an extended period of time, differences in average profits cannot be attributed to differences in risk. The differences of higher than average profits in good years tend to equal the differences of the lower than average profits of poor years. If this did not occur, then it would always be advantageous to invest capital in the most risky industries, for they would consistently return higher than average earnings.

However, the assumption appears to have been that, over the long term, profit rates would reach a common level. This has been true for stone, clay, and glass products but not for lumber and wood products. Our industry seems to have failed in good years to obtain the insurance charges and uncertainty payments covering the risk of losses in poorer years.

Evaluating Risk by Industries

We have difficulty in establishing the relative risk of various industries in more than general terms. In a recent attempt, fluctuations in profit rates were compared with those for low risk industries (*3*). Using data from various government commissions, it was found that in the 1949-1958 period the average of annual profit rates for private electric utilities was 15.5 percent, for telephone carriers 14.5 percent, for lumber and wood products 16.2 percent, and for stone, clay, and glass products 26.3 percent. It was assumed that high-risk lumber showed no greater difference from the regulated low-risk industries, because it is a sick, abnormal industry. The difference for stone, clay, and glass could only be explained as that industry's compensation for its greater risk (compared to the regulated industries).

This assumes that the regulated industries had "normal" profit rates. However, they do seem to have been a little low when compared to total manufacturing rates as determined from the "Statistics of Income" information and as calculated for the 1949-1958 period from the reports of the Securities and Exchange Commission and the Federal Trade Commission. The latter showed the average for total manufacturing to be 22.5 percent. Using the last figure as a base, the average payment for additional risk for stone, clay, and glass products in that period was 26.3 — 22.5 = 3.8 percent of invested capital per year.

Incidentally, our data indicate that more than 10 years may be needed for balancing forces to average out inter-industry differences, where such differences do not have a permanent distortion, as appears to be true for lumber. Professor Crum observed that the forest products industry in the 1930's "might fairly be described as resistant to recovery" (*5*).

Another Way of Measuring Risk

An indication of the relative risk of different industries can be obtained by determining the degree of profits fluctuation on a year-to-year basis. Such an analysis shows lumber and wood products to have a much larger profit fluctuation (risk) than total manufacturing or the competing stone, clay and glass products industry, as shown in Table 3.

We need no detailed statistical analysis to conclude that, for the industries as a whole, the chances of important losses are much greater in our industry than for our competitor. However, we should note that in the 1949-1959 data, for half of the 10 years the change for lumber was more than 40 percent of the rate for the previous year. The fluctuation also exceeded 40 percent for eight of the 18 years in the 1939-1957 lumber data.

Cost and Price Changes as Risk Indicators

Beardsley Ruml, among others, has pointed out that the greater the uncertainty of the cost of goods or of the price at which they can be sold, the larger the margin of profit which must be projected (*12*). Costs in lumber and wood products manufacture are subject to wider than normal variation because of the larger than normal use of labor, the difference in timber stands and logging conditions, and wide fluctuations in the stumpage market.

Cost control is increasingly difficult as the labor share of cost increases. Costs related to equipment depreciation are more predictable. Data from the Census of Manufacturers were used for Table 4, which shows that lumber uses much more labor than its competitor.

Raw material (stumpage) prices have fluctuated widely in the past 10 years for the segment of the industry that is dependent on short-term supplies, such as those purchasing public timber. Since, at least theoretically (*17, 30*), stumpage price is a residual value left after other costs and profits are taken from the final product price, that final product price is an important risk consideration in more ways than one.

Table 5 was prepared to show the uncertainty of lumber and wood products prices compared to those for stone, clay and glass products

TABLE 3.—FLUCTUATION IN PROFIT RATES BY INDUSTRIES
(Average year-to-year shifts in earning rates)

Averages	Total manufacturing		Lumber & wood products		Stone, clay & glass products	
	1949-1959[1]	1939-1957[2]	1949-1959[1]	1939-1957[2]	1949-1959[1]	1939-1957[2]
Profit rate	22.18	19.85	16.19	15.68	26.08	20.58
Amount change from previous year	3.00	3.71	5.87	6.09	4.52	3.93
Change as % of previous year's rate	13.14	22.35	39.00	57.10	18.60	22.41

[1]Source: Federal Trade Commission and Securities and Exchange Commission. Quarterly Financial Report for Manufacturing Corporations.
[2]Source: Bureau of Internal Revenue. Statistics of Income, Corporate Returns.

TABLE 4.—LABOR REQUIREMENTS BY INDUSTRIES, 1950-1957

	Workers per $1 million value added by mfr.	Man-hours per $1,000 value added by mfr.
Lumber & wood products	187.6	352.0
Stone, clay & glass products	108.7	221.1

Source: U. S. Census Bureau. Census of Manufacturers.

(primarily "nonmetallic minerals, structural"). During the period covered, stone, clay and glass product prices never dropped but went up nearly 30 percent. At the same time, lumber and wood products prices dropped five years out of the nine comparisons, and the over-all increase in the 10 years has been less than 10 percent. As of February 1961, the two indexes were at 114.9 and 138.4, emphasizing the erratic action of the lumber market compared to that of its competitors.

Lumber Failure Rate and Risk

Evidence that these indicators of risk do have meaning is the industry's failure rate. Table 6 was taken from a Survey of Current Business article, which observed that discontinuance rates serve as the better estimate of turnover rate "which, with due allowance for variations in composition with respect to size, age, etc., are the closest available indicators of comparative ease of entry and degree of risk" (*23*).

During the period covered by the report (1951-1955), the lumber industry's profits were higher than in more recent years. However, even there it was found that, "Within manufacturing the lumber group ranks highest, with an average annual discontinuance rate more than double that of the division as a whole and substantially higher than that found for any other group in or out of manufacturing. The lumber group is particularly volatile and although the average lumber firm is small in comparison to other manufacturing groups, it is not small at least in terms of employment when compared to eating and drinking places in retail trade or miscellaneous repair stops in services, each of which has a much lower average discontinuance rate" (*23*).

Some of the Consequences

Focusing our attention on the past decade, we can see some of the consequences of the supply-demand and price-cost trends indicated by lumber's poor profit position. As shown in Figure 3, as our industry has received relatively lower profits compared to the "all-manufacturing" average, our competitor has done much better, and our contribution to the economy has shrunk.

Lumber's share of the total value added by manufacture shrank from about 3.5 percent in 1950 to 2.2 percent in 1958. Starting at the same point in 1950, stone, clay, and glass products went up to 3.9 percent in 1958 (*19, 20*). The Department of Commerce says that "value added by manufacture" is the best value measure available for comparing the relative economic importance of manufacturing among industries.

Especially significant for the degree of use of the timber resource has been the decline in lumber's share of total manufacturing expenditures for new plants and equipment. Except for a 1955 increase, the position has been down from nearly 4 percent in 1950 to less than 2 percent in 1957 and 1958. Stone, clay, and glass products has increased its share from 4.5 percent in 1950 to more than 5.5 percent in 1957 and 1958 (*21*).

Lumber's share of the total capital invested in manufacturing was greater than that of the competing industry in 1949. By 1953, they had reversed positions, and the most recent data, 1956, shows the stone, clay and glass products industry still in the lead. Other data suggest that the gap has widened in more recent years (*11*).

The two industries' positions were again reversed, with lumber dropping from a 1950 level of nearly 4 percent of the national income originating in manufacture to 2.5 percent in 1957 and 1958. Stone, clay, and glass products manufacture has contributed close to 3.5 percent throughout the period (*11*).

Lumber has stayed ahead in its share of total manufacturing employment, but the trend has been down, while the competing industry has maintained a constant share of the employment total (*22*). However, lumber, with much of its production in the South, has been consistently and increasingly below the all-manufacturing average weekly gross earnings for employees. The stone, clay, and glass products industry has moved above the average (*22*).

Production indexes show lumber and wood products moving down

TABLE 5.—WHOLESALE PRICE INDEXES, 1947-1949=100

	Lumber & wood products		Nonmetallic minerals, structural	
Year	*Index*	*Change*	*Index*	*Change*
1950	113.9		106.9	
		+10.0		+6.7
1951	123.9		113.6	
		− 3.6		—
1952	120.3		113.6	
		− 0.1		+4.6
1953	120.2		118.2	
		− 2.2		+2.7
1954	118.0		120.9	
		+ 5.6		+3.3
1955	123.6		124.2	
		+ 1.8		+5.4
1956	125.4		129.6	
		− 6.4		+5.0
1957	119.0		134.6	
		− 1.3		+1.4
1958	117.7		136.0	
		+ 8.1		+1.7
1959	125.8		137.7	

Source: U. S. Department of Labor. Statistical Abstract of U. S., 1959. pp. 330, 331.

TABLE 6.—TURNOVER OF BUSINESS CONCERNS, 1951-1955

	Firms[1] in operation January 1		5-year average annual turnover rate[2]		
	1951	*1956*	*New*	*Discontinued*	*Transferred*
All industries	4,067.3	4,381.2	86	71	89
Manufacturing	322.8	327.3	85	82	50
Lumber and timber basic products	50.9	48.9	175	182	52
Stone, clay and glass products	13.3	12.9	58	64	54
Retail trade	1,820.9	1,903.2	76	67	135
Service industries	733.0	789.6	78	63	72

[1]In thousands.

[2]Annual rates are number of new, discontinued or transferred businesses during the year per 1,000 firms in operation at the beginning of the year.

Source: U. S. Department of Commerce. Survey of current business. May 1959. p. 19.

compared to a composite index of construction materials and the total manufacturing index. Compared to the latter, stone, clay, and glass products manufacture has gone up (*22*).

Industry's Position Worse Without Capital Gains

There can be no doubt about the timber products industry being in much worse shape without liquidating its capital asset of timber and the resulting lower taxes as recognized in the capital gains provision of the tax law. According to Bureau of Internal Revenue reports, summarized in Table 7, corporate lumber and wood products manufacture would have sustained a sizable net loss after taxes in 1957 without capital gains, which are taxed at 25 percent effective rate instead of 52 percent for firms earning above $25,000. In 1956, capital gains accounted for 84 percent of net profits reported by lumber and wood products corporations submitting balance sheets to the Bureau of Internal Revenue.

The purpose of this discussion is to recognize this important aspect of timber liquidation and its contribution to the industry's profit picture, and not to question legislative tax policy. Incidentally, Professor Samuelson reported that many experts do not consider capital gains as income and added that in England, capital gains as such are not taxed at all (*13*).

The capital gains treatment became important in the mid 1940's when, to promote equity and fairness in taxation, Congress adopted Section 117(k) (1) and (2) of the Internal Revenue Code (now Section 631 [a] and [b] [*1*]). This was just before the post-war housing boom and the sharp acceleration in rising stumpage rates. While lumber and wood products real prices climbed 35 percent from 1945 to 1950 and then began a decline, stumpage rates for some important species more than doubled according to Forest Service reports (*18*), and then continued up to 3 or 4 times the 1945 real price, before dropping sharply in 1957 and 1958. With the 1958 real price of lumber and wood products below the 1947-1949 average, stumpage rates were

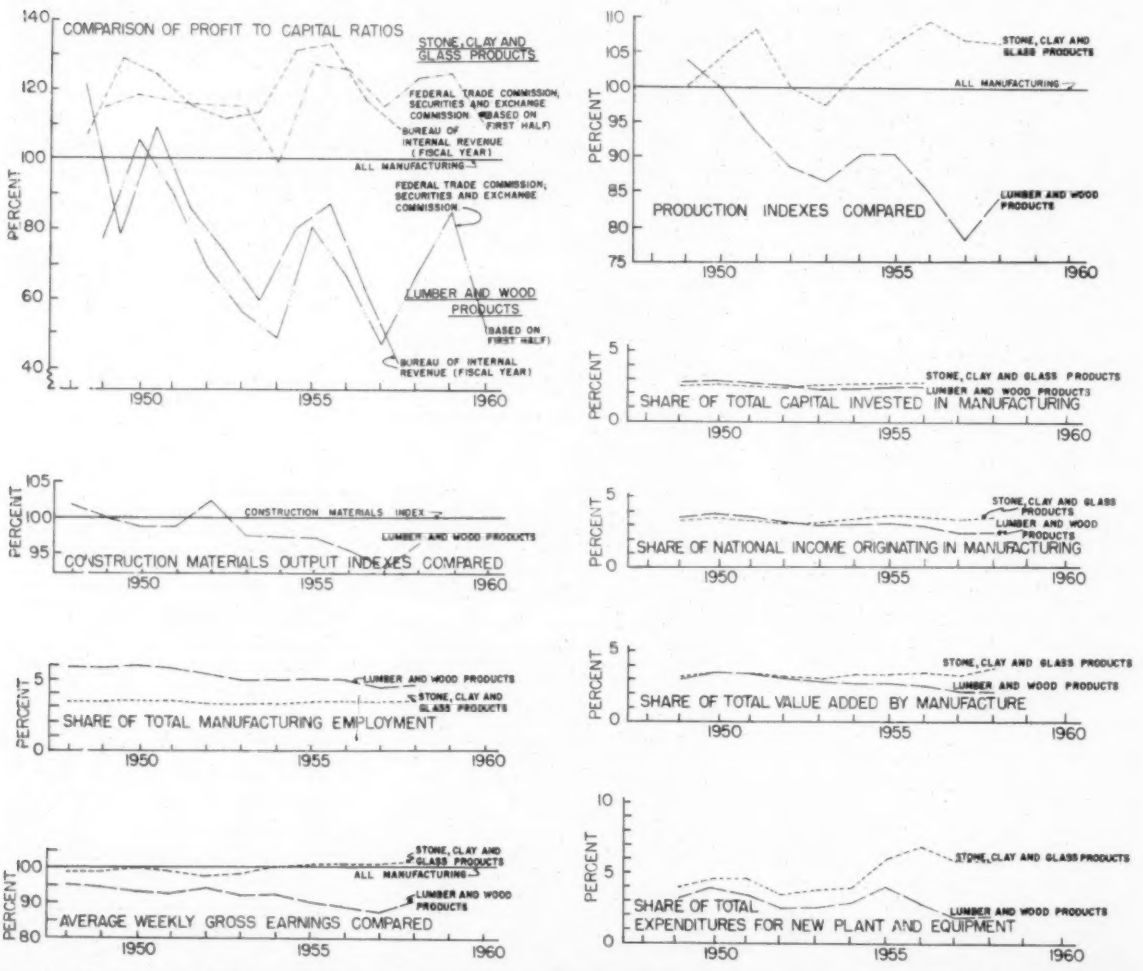
COMPARISON OF PROFIT TO CAPITAL RATIOS
STONE, CLAY AND GLASS PRODUCTS
FEDERAL TRADE COMMISSION, SECURITIES AND EXCHANGE COMMISSION (BASED ON FIRST HALF)
BUREAU OF INTERNAL REVENUE (FISCAL YEAR)
ALL MANUFACTURING
FEDERAL TRADE COMMISSION, SECURITIES AND EXCHANGE COMMISSION
LUMBER AND WOOD PRODUCTS
(BASED ON FIRST HALF)
BUREAU OF INTERNAL REVENUE (FISCAL YEAR)
PERCENT
PRODUCTION INDEXES COMPARED
CONSTRUCTION MATERIALS OUTPUT INDEXES COMPARED
CONSTRUCTION MATERIALS INDEX
SHARE OF TOTAL MANUFACTURING EMPLOYMENT
AVERAGE WEEKLY GROSS EARNINGS COMPARED
SHARE OF TOTAL CAPITAL INVESTED IN MANUFACTURING
SHARE OF NATIONAL INCOME ORIGINATING IN MANUFACTURING
SHARE OF TOTAL VALUE ADDED BY MANUFACTURE
SHARE OF TOTAL EXPENDITURES FOR NEW PLANT AND EQUIPMENT

FIG. 3.—Consequences of the wood industry's supply-demand and price-cost trends are reflected in a number of indicators of economic growth or decline. They show that lumber is lagging or slipping while contributing relatively less to meet the growing demands of our society. Source: U. S. Dept. Commerce. Economic almanac; U. S. Dept. of Labor; U. S. Treasury Dept.; and Federal Trade Commission.

TABLE 7.—PROFITS AND CAPITAL GAINS AFTER TAXES
(Averages for periods of five fiscal years in millions of dollars)

Period	Total manufacturing				Stone, clay & glass products				Lumber & wood products			
			Capital gains				Capital gains				Capital gains	
	Invested capital	Profits	Actual[1]	As % of profit	Invested capital	Profits	Actual[1]	As % of profit	Invested capital	Profits	Actual[1]	As % of profit
1944-1948	67,000	6,550	149.8	2	1,823	160.3	2.1	1	1,268	136.8	26.9	20
1949-1953	98,119	10,497	288.7	3	2,786	341.7	6.0	2	2,411	275.9	97.8	35
1954-1958	130,148	10,892	480.5	4	4,448	445.6	13.2	3	2,893	193.5	140.0	72

[1]Equivalent to 75% of net long-term capital gain reduced by net short-term capital losses.
Source: Bureau of Internal Revenue. Statistics of Income.

still well above that 3-year level.

It is interesting to speculate as to how this tax feature has affected "residual" stumpage rates and to wonder about its consequences to the capital growth of the manufacturing segment of our industry.

What of the Future?

These data substantiate Professor John A. Zivnuska's finding (*31*) that the holding of timber for increases in stumpage values rather than the manufacture of lumber was the prime source of profits in the lumber industry (*31*). However, relatively few lumber and wood products manufacturers have sizable holdings of timber.

With their increasing dependence for timber requirements on public and nonoperating ownerships, many lumber and wood products manufacturers will have little incentive or source of funds to make the further investments in their plants that are needed to more completely use the public and other timber resources. As a result, our relative contribution of useful products and an effective employment base may continue to shrink and a large part of our profession's potential contribution to society may not be realized.

We know that some of the steps toward a healthier industry are greater mechanization, more research, product development, and sales promotion — all requiring more capital. The importance of capital formation is shown in Table 2. Profits are essential to the obtaining of more capital.

Although there are no easy answers to the problem, there would appear to be some general areas in which many of us can help. First, we must be continuously conscious of costs and do what we can to eliminate those which are unnecessary. Further, we can promote the use of wood products. Finally, we can help bring wider understanding of the profit position of the industry, so that fewer uninformed optimists lose their shirts while adding to the problems of cutthroat stumpage battles, overproduction, and destructive lumber-price competition.

We need the increased profits which will permit us to compete with other industries in modern terms — through innovation and service, as well as price.

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Production of White-Cedar Browse by Logging[1]

Louis J. Verme

NORTHERN white-cedar (*Thuja occidentalis*) is an important species in deeryards of northern Michigan, and its browse is particularly nutritious for deer (*2*). Where overpopulations of white-tailed deer (*Odocoileus virginianus*) occur, winter logging operations which supply needed browse constitute an important phase of range-herd management. However, a wide variety of methods is used to harvest swamp conifer timber. Thus, where production of deer browse is of paramount importance, it is desirable to know the relation of different cutting systems to browse yield. This paper deals with a study on the amount of browse made available through logging in a northern white-cedar stand by various cutting practices.

Study Area and Methods

The area selected for study is located near Shingleton, in the Upper Peninsula of Michigan. The swamp conifer stand on this site was fully stocked (averaging approximately 200 square feet of basal area per acre), essentially all-aged, and dominated by mature white-cedar largely 9-15 inches d.b.h. A light stocking of balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), and tamarack (*Larix laricina*) also was present, generally in the smaller size classes. Originally, trees of these species comprised a greater proportion of the stand; however, a pulpwood harvest 15-20 years earlier removed much of the larger timber. This harvest probably released saplings and advanced growth of white-cedar, hence the stand naturally converted to the nearly pure white-cedar type. Moreover, removal of overstory trees probably resulted in an increased production of white-cedar browse, especially on the smaller trees, due to the greater amount of sunlight reaching the understory.

Timber cutting operations were limited to the winter months, December through March, over a period from 1955 to 1958. Results of this study are based on the harvest of 9.4 acres of timber in the work area. Three main cutting intensities were studied, consisting of 6-, 8-, and 10-inch minimum stump diameters for white-cedar, and a 6-inch stump limit for all other conifers. This work was conducted in a 9-acre block of timber, comprising an area nearly 9.5-chains square. Study of browse production for each cutting intensity consisted of harvesting trees on three 1-acre plots situated in tandem within the work area. A tenth plot was located adjacent to the study site for the purpose of appraising the production of browse resulting from a clearcutting system of timber harvest. In this plot all white-cedar was removed that would make a 7-foot stick with a 2-inch top diameter, as well as all pulpwood providing an 8-foot length with a 4-inch top. However, as only 0.4 of an acre was cut in this manner, when the study was terminated per acre values were determined by expanding the data obtained in the sample.

Species composition and stocking data before and after logging were reconstructed for each plot after completion of the harvest. This was done by means of a 20 percent cruise in each cutting unit using circular fifth-acre plots. In order to determine basal areas it therefore was necessary to convert stump diameters to d.b.h. measurements. A rough factor of 0.8 was used for these computations.

Prior to cutting the boundary of each acre plot was marked in order to control logging adequately. When a white-cedar was felled the limbs were lopped and the terminal portions (1-3 feet in length) collected and gathered into bundles. Unfortunately, an estimated 10-20 percent of the browse could not be collected efficiently, especially the sparse foliage on overmature trees. Data in Table 2 therefore are low by the amount of browse inadvertently wasted.

The cut browse was fed to experimental penned deer at the Cusino Wildlife Experiment Station. Because the browse was fed usually within a few days after collection, very little loss of moisture occurred to influence green weight. Browse yield was computed on the basis of weight of forage consumed by deer. Yield for each of the three 1-acre plots was recorded separately and later combined and averaged. Browse fed was not al-

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[1]A contribution of Federal Aid in Wildlife Restoration Project, W-70-R, Michigan.

TABLE 1.—STAND COMPOSITION AND HARVEST IN RELATION TO CUTTING METHOD IN A NORTHERN WHITE-CEDAR STAND[1]

Stump diameter cutting limit	Trees per acre	Basal area per acre	Trees cut per acre	Basal area cut/acre
Clearcut	667	180	600	168
% w. cedar	(87.4)	(87.3)	(91.7)	(92.2)
6-inch	553	217	406	176
% w. cedar	(85.8)	(80.1)	(87.7)	(91.8)
8-inch	433	176	292	140
% w. cedar	(86.8)	(92.1)	(91.4)	(95.2)
10-inch	426	172	227	121
% w. cedar	(89.0)	(93.7)	(93.4)	(96.6)

[1]Cruise data are based on trees 3.5 inches in stump height diameter for the clearcut plot and 5.5 inches for the other cutting levels; basal areas represent d.b.h. values, and are in square feet.

ways completely consumed, although deer wasted only a negligible amount of it. The comparatively small amount of pulpwood browse obtained in the study also was fed to deer, although the yield was not recorded for these species.

This work used essentially the same study methods developed in a comparable earlier Michigan project (*3*). An alternate method of collecting such data, consisting of hand-clipping and weighing browse contained on sample trees, was used by Aldous (*1*), and Stoeckeler et al. (*4*). This method is laborious and time-consuming and therefore impractical for the current large-scale browse collection program.

Results and Discussion

Data presented in Table 1 show that white-cedar completely dominated the site, comprising 85-90 percent of all trees 5.5 inches in diameter or larger at stump height. Species composition and stocking were generally uniform, as evidenced by only slight variation in data among the three main cutting plots. Stand variability therefore did not influence the results of the study.

As could be expected, number of trees and basal area harvested decreased with a higher stump diameter cutting limit. For example, nearly twice as many trees were removed in the 6-inch limit plot as at 10 inches, or 406 and 227 per acre, respectively. However, the 10-inch cutting plot mainly was stocked in large trees, hence residual basal area was only slightly greater than at the 6-inch limit, amounting to 51 and 41 square feet per acre, respectively. Nearly all of the growing stock in the clearcut plot was harvested as a result of the low minimum cutting limit designated for all species. More than 90 percent of the total basal area removed in all cutting plots consisted of white-cedar.

The greatest production of browse, approximately 5,340 pounds per acre, was obtained by clearcutting, while only about 2,530 pounds resulted from the 10-inch limit (Table 2). Browse yield for the 6- and 8-inch harvest amounted to approximately 4,780 and 3,330 pounds per acre, respectively. There was a normal tendency for proportionately greater foliage production on the smaller, thriftily growing trees, in contrast to that of low-vigor, decadent large trees. This is apparent from the fact that clearcutting produced 34.5 pounds of browse per square foot of white-cedar basal area cut, compared to only 21.6 pounds for the 10-inch cutting limit. Yield per tree was highest for the 6-inch limit (13.4 pounds), however, and lowest (9.7 pounds) for clearcutting.

TABLE 2.—YIELD AND CARRYING CAPACITY VALUE OF WHITE-CEDAR BROWSE IN RELATION TO CUTTING METHOD

Stump diameter cutting limit	Pounds per acre	Carrying capacity[1]		
		Deer-days	Deer/acre	Deer/forty
Clearcut	5,340	1,068	10.7	427
6-inch	4,780	956	9.6	382
8-inch	3,330	666	6.7	266
10-inch	2,530	506	5.1	202

[1]Data are based on a consumption of 5 pounds of browse per deer-day for a 100-day yarding season.

Increased carrying capacity resulting from the various logging programs is shown in Table 2. The data are based on a daily intake of 5 pounds of white-cedar browse per deer, a ration found to provide adequate nutrition during a yarding season of roughly 90 days (*2*). Accordingly, the equivalent of 506 and 1,068 deer-days of browsing was provided per acre by the 10-inch limit and clearcut system, respectively. In this study the amount of browse made available was sufficient to nourish about 5 and 11 deer, respectively, per acre during 100 days of winter. Logging in this manner on 40 acres would provide forage for approximately 202 and 427 deer, respectively. Browse yield values for the 6- and 8-inch cutting limits are between those above, as previously noted. Carrying capacity rates described are based on the assumption that all felled forage is available to deer; that is, not piled densely, buried beneath snow, or out of reach.

The following data, collected earlier by L. A. Davenport (*3*), are presented to show how factors other than cutting methods influence browse yield. Clearcutting of 7¼ acres in typical mixed, all-aged swamp conifer-hardwood timber yielded an average of approximately 2,300 pounds of browse of all species per acre. Yield varied from about 1,600 to 3,800 pounds per acre among the various sample plots harvested. As a rule browse yields were greatest in stands well stocked in white-cedar. Clearcutting of 6¼ acres predominantly in well-stocked, early-mature white-cedar provided around 2,600 pounds per acre of this species. However, variation in yield ranged from nearly 1,800 pounds to about 3,700 pounds per acre. Likewise, a heavier yield was associated with a higher stocking of white-cedar in the sample stand.

It is evident, therefore, that a considerable quantity of deer browse is made available through logging, although the amount and nutritional quality varies with the forest type and structure of the

stand, and the cutting system used in harvest.

Data presented are valuable as rule-of-thumb guides in planning timber cuttings made primarily for the winter welfare of deer. The effectiveness of prescribed cuttings in fulfilling browse requirements can be appraised once logging has begun, and adjustments in intensity of harvest or acreage necessary can be made periodically.

Summary

A study on the amount of white-cedar browse made available to deer by logging an all-aged, mature northern white-cedar stand revealed that yield varied directly with intensity of cut. Clearcutting produced the greatest yield, approximately 5,340 pounds of browse per acre, while cutting to a 10-inch minimum stump limit produced only 2,530 pounds. This amount of browse would be sufficient to nourish about 11 and 5 deer per acre, respectively, during 100 days of winter. Logging in this manner on 40 acres would therefore support 427 and 202 deer, respectively, over winter. Browse production values for the 6- and 8-inch cutting limits are between those above.

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Theory and Practice of Commercial Thinning in Douglas-Fir[1]

Norman P. Worthington and George R. Staebler

THINNING is doubtless the major silvicultural practice that characterizes the change from extensive to intensive forestry. As a positive cultural practice, it goes beyond the basic protection and regeneration measures that keep forest lands productive. In fact, forestry cannot properly be called intensive until deliberate cultural practices such as thinning are undertaken.

Though premerchantable thinnings probably have more far-reaching economic effects, this discussion is limited to commercial thinnings—those that produce merchantable products having a value at least equal to the cost of their extraction.

About 5 million acres of young-growth Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) within the Douglas-fir region of Oregon and Washington could be termed "ripe for thinning." This estimate is based on reasonable specifications of stand age, terrain, site, accessibility, and markets. Commercial thinning of this acreage is believed capable of adding 3-½ million cords, or 1-¾ billion board feet, to the annual cut of the region without impairment of existing productivity.

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[1]This paper is a condensation of a manuscript prepared by the authors for a U. S. Dept. Agric. technical bulletin on commercial thinning of Douglas-fir in the Pacific Northwest.

Theory of Thinning

Thinning, like all phases of silviculture, is an art and must be applied according to the judgment of the practitioner. It embodies two major objectives that will result in economic gain: (1) redistribution of total stand growth to fewer trees and (2) utilization of all merchantable material produced during a rotation.

In the Douglas-fir region several incidental benefits may follow automatically in a thinning that carries out these two main objectives: (1) reduced fire hazard, (2) reduced likelihood of disease and insect attack, and (3) retention of trees with desirable hereditary characteristics as a seed source for the succeeding stand.

Knowledge and understanding of the silvical factors that control development of trees and stands are necessary for the intelligent application of silviculture. For thinning, important factors include (1) tolerance, (2) variation among trees, (3) growth in height, diameter, and form, (4) wood and tree quality, (5) site preferences, and (6) wind-firmness.

Since Douglas-fir is intolerant of shade, stands are universally even-aged and usually well enough stocked to benefit from thinning at early ages. Diameter varies widely in thinnable stands, with the range roughly equal to the average diameter of the stand plus 2 or 3 inches. Height growth is rapid after the first 10-year period, an important characteristic in thinning since growth in height largely controls crown development. Crown development in turn governs tree response following release. Increased diameter growth, which is sought in thinning, depends upon maintenance of large, thrifty crowns, at least 40 to 50 percent of total height. Such crowns require ample growing space. Rapid diameter growth of selected trees can be sustained up to ages of 70 years on good sites. The smaller trees in a well-stocked

stand of Douglas-fir grow so slowly that they do not contribute to growth of the stand in proportion to their basal area or volume.

Results of recent thinning research in Douglas-fir indicate that:

1. In a stand old enough for a commercial operation, thinning is unlikely to stimulate diameter growth sufficiently to produce wood with fewer than six rings per inch.

2. As quality factors, knots and limbiness have little effect on thinning practice because knot sizes encountered in all but the most understocked stands affect lumber grades only slightly.

3. Douglas-fir is singularly free of insects and disease. A root fungus (*Poria weirii* Murr.) is serious in some stands, however, and dead or infected trees should always be removed.

4. Young Douglas-fir is naturally wind-firm except on sites with a hardpan or high water table.

5. Thinning should produce trees with a height-diameter ratio of not over 80:1.

6. Response to release lessens as the tree grows older, is greater on good sites, and is greatest in trees having neither too much nor too little crown.

Although not demonstrated by research, significant release is apparently seldom attained on site II after 70 years and on site III after 60 years.

Although many trees normally die from suppression, considerable numbers of larger Douglas-firs also die from other causes. Because it is very difficult to identify dominants and codominants that will die, thinnings should be frequent enough to permit salvage while dead trees are still usable. On the average, annual losses of 200 board feet (International 1/8-inch rule) per acre can be expected in unthinned stands after age 45 on site II, or age 55 on site III. This exceeds the total net increment of many forest types in the United States.

Thinnings will affect stand yields in two ways, which in turn will influence choice of rotation: (1) by increasing diameter growth of the average tree and (2) by delaying culmination of mean annual increment. An above-normal diameter growth rate can be attained only if thinnings are started early enough in the life of the stand to satisfactorily redistribute increment. The rotation under a thinning regime should ordinarily be long enough to produce a tree that is larger on the average than that produced in unmanaged stands. For stands on sites II and III, gross board-foot increment (assuming periodic salvage and utilization of most merchantable mortality) culminates about 30 years later than net increment.

Growing-stock levels in periodically thinned stands may be held much lower than those normally found in unmanaged stands, with little or no sacrifice of increment. This is true because (1) every well-stocked stand includes many trees that contribute very little to total increment, (2) individual tree diameter growth in well-stocked stands is far below the maximum possible, and (3) under a thinning regime many trees that will die before the next thinning can be removed from the growing stock.

Thinnings will increase total yields through salvage of normal mortality and production of larger trees. At a rotation age of 100 years, frequent commercial thinnings may increase board-foot yield from 20 to 30 percent over that in unmanaged stands. These modest estimates do not consider the possible effects of early premerchantable thinnings, which will promote even greater yields, according to the fragmentary evidence now available.

Applicability of Thinning

A commercial thinning should be carried out if it can be done at a profit and is silviculturally desirable. Some of the physical and economic factors influencing profit from thinning are:

1. Crews. Small, independent contract crews of 1 to 4 men, with a productivity exceeding 2 cords per man-day, operate more efficiently than large company crews.

2. Access. Good accessibility keeps road costs moderate.

3. Markets. Ready markets must exist for material produced and be within an economical hauling distance.

4. Topography. The effect of topography on skidding is most important. Horse skidding is difficult on slopes over 40 percent. Crawler tractors may handle slopes only slightly steeper. A modified high-lead system has been used successfully on slopes up to 60 percent.

5. Stand characteristics. Size of trees to be cut and amount cut per acre must be sufficient for a profitable operation. In the Puget Sound area, minimum requirements are approximately 7 inches d.b.h. and 5 cords per acre, respectively.

Thinning methods should doubtless follow a flexible rather than a rigid sequence. A sequence of methods similar to the following is suggested: If the largest trees in a young stand (ranging from 20 years on site II to 40 years on site IV) are merchantable, a selection thinning (removal of largest stems) may be made. After the largest, roughest trees have been removed in two or three light selection thinnings, crown thinnings should be started to favor potential crop trees. Thinnings of this kind should normally be carried on until it is no longer possible to redistribute growth to trees in either the upper or lower crown classes. By this time, trees in the lower crown classes will be of merchantable size and low thinnings will be practicable. Normally, a series of low thinnings would then be made before final harvest.

Marking is the essence of thinning. Suggested marking rules would remove trees in the following order of priority: (1) merchantable trees that are dead, will not live until next thinning, or are slow growing; (2) rough, limby dominants whose removal will release trees of better quality; (3) trees whose removal will improve spacing, provided remaining trees will respond to release; and (4) diseased, misshapen trees. In applying the guides, however, no reserve tree should be released on more than one side in any one thinning. Application of these guides will result in a thinning that follows no classical system.

Marking time may run from 0.05 to 0.10 man-hour per cord or 0.12 to 0.50 man-hour per M board feet.

Severity of thinning is difficult to specify, but volume removed can be placed at roughly one-half of the cubic-foot increment between thinnings. This may range from 1-½ percent per year of growing stock in older stands to perhaps 4 percent in younger or more responsive stands.

Carrying Out the Thinning Operation

Financial success of a Douglas-fir thinning hinges largely on how well the harvesting operation is geared to small trees and light cuts per unit area. Perhaps in no other forest type in the United States is there a greater contrast between logging the virgin stand and thinning young growth.

Permanent roads are necessary for successful thinning, and they often may be a limiting financial factor. However, temporary makeshift construction will in most cases prove uneconomical, and it is best to build roads that will be usable for harvest of the final crop and for other management purposes. Road spacing will depend upon skidding equipment, topography, and nearness of public roads. A reasonable estimate is 1 mile to 140 acres. At this spacing, the right-of-way occupies approximately 3 percent of the forest area. Allowing a 20- by 20-foot spacing for final crop trees, however, compensates for over half of the road area loss.

Light, mobile, inexpensive equipment should be the rule in thinning young stands, since large, fixed equipment cannot produce enough volume to give reasonable unit costs. Many thinning jobs are overmechanized and overmanned. More research on thinning equipment is needed; meanwhile, horses, light rubber-tired tractors, or very small crawler tractors seem best.

The extraction process naturally divides into two parts: (1) felling, bucking, and skidding; and (2) loading and hauling. For large-scale commercial thinnings, foresters might consider dividing the work along these lines. The woods work could be contracted to small crews limited to roadside delivery. Company or larger contractors might take over at this point with a crew specifically equipped for loading and truck hauling.

Conclusions

Douglas-fir often grows in such dense stands that, without thinning, crowns become greatly shortened and growth inevitably suffers. In younger stands (less than 70 years), this condition may be remedied by thinning, which releases chosen trees and stimulates their growth.

Thinning produces small wood and lots of it. This fact is a controlling influence in determining thinning methods or combination of methods. Marking is influenced by minimum merchantable tree size and stand age. Extraction methods, crew organization, and equipment must also be built around this obvious limitation of tree size. Probably the greatest single hurdle in carrying out a profitable commercial thinning in the Douglas-fir region is the failure to recognize that thinning is an entirely different operation from logging mature timber.

In preaching the gospel of thinning, we must keep in mind that the objectives of thinning older stands (over 70 years) are limited to salvage of mortality and realization of income before final harvest. In these older stands, no growth stimulation or marked improvement in tree quality can be expected. To achieve growth and quality improvement, commercial thinnings should be started in the 30- to 50-year age class or even earlier.

New Forest Service Publication on Wilderness

The Forest Service has released a new 16-page leaflet *Wilderness* (lands) of the national forests. Containing descriptions of early-day efforts of Forest Service leaders to pioneer the concept of wilderness land management and a map showing the distribution of 73 acres of national forest wilderness in 14 states, this publication defines Forest Service policy in keeping 14½ million acres of dedicated forest wild lands "intact for this and future generations of Americans." It is available upon request from the Washington and regional offices of the Forest Service or may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 20 cents a copy.

The Urban Strip versus Forestry in New England[1]

H. A. McKusick

I APPROACH this subject with a great deal of trepidation. As the title indicates, there is here a conflict of human interest in land use that seems to be well nigh impossible to interpret. Since the beginning of the Industrial Revolution in this country in the mid 1800's, we have seen our small New England towns slowly decline in population with accelerated growth of commercial and industrial centers. This decline in population continued into the 1940's in southern New England and is still going on in some of the towns of northern New England. The hallmark of this population decline was abandoned farms, with their farm buildings and cellar holes, their fences and stone walls slowly being overgrown by the reinvading woodland and forest; and the moldering dams, and foundations of little mills and shops that once huddled close to the streams of the countryside. This is at best oversimplification of the effect of profound sociological and economic factors that spanned 60 or more years.

For the past decade, we have seen and lived with a new movement of population—back out of the cities into the countryside. This is not, however, a rebirth of agriculture, although it may be a move toward a decentralized industry. This population shift may well have demographers puzzled for the next generation. Unfortunately, foresters and other land managers cannot wait too long before planning a course of action to follow in relation to this explosion outward from our cities, for there is danger that the forest and some, perhaps most, of its benefits to our society may be destroyed.

One can still find evidence of these two effects going on within a relatively small geographical area—land going out of agricultural use and into forest, and land going from forest into urban development.

There is no generally accepted name for this new pattern of settlement—this industrial, commercial and residential spread. Some of the kinder terms applied are suburbia, urban growth, planned regional development, area planning, ribbon and strip development. Terms having somewhat uglier connotations are urban sprawl and urban blotch. The outright pessimist is likely to see this population movement as developing rural slums.

Harold Martin in a series of three articles published in January of this year in the *Saturday Evening Post* uses the term "Megalopolis." He gives the French geographer Gattman credit for coining the term and it seems most apt as we become conditioned to the use of this combining form--mega—to express the force of atomic and hydrogen explosions that are beyond comprehension. Martin is graphic in his descriptions of Megalopolis. For those of you who did not see his articles, I would like to quote the opening paragraphs:

> The airline pilots saw it when it first began a dozen years ago. Flying by night out of Boston, northward toward Portland, Maine, and south to Providence, New York, Philadelphia, Baltimore, and Washington, they watched the dark land between the cities come alive with the lights of homes and shops and factories. The face of America was changing. Out of the angers and dissatisfactions of millions of people, out of their hopes and dreams and aspirations, Megalopolis—the "Great City"—was being born.
>
> It started slowly in the first years, for cars were hard to come by just after the war, and this was a mass migration that could only be supported by the automobile. First the cities began to send out thin fingers of light along the radial highways, poking deeper and deeper into the empty hinterland.
>
> Soon, though, this pattern changed. As Detroit performed its miracle of production, starfish clusters of light began to form along all the rural roads that ran between the great arterial highways. And then these clusters grew and ran together and multiplied and spread, until the overflow from one central city began to blend and merge with that of another miles away.
>
> The cities, somebody said, were like huge bonfires, sending out sparks that fell at random to light new fires in the surrounding dark. Somebody else, less poetic, saw the whole Northeastern Seaboard as a giant panful of fried eggs whose whites spread until they touched.[2]

The exact boundaries of the (New England Urban) Strip are hard to determine, if indeed there are definite boundaries. It is quite probable that its influences extend or will extend much further than would be immediately apparent. It seems to me that forests and forest holdings in areas quite remote may well feel some effects. There will almost certainly be a new class of displaced persons who will leave the Strip in search of the values being destroyed by suburbia. In the foreseeable future, it is probable that the water requirements will exceed those that can

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[1]Adapted and condensed from a paper delivered at a meeting of the New England Section of the SAF in 1960.

[2]Quoted with permission from The Curtis Publishing Company.

be economically gathered within the Strip itself. The homes being built use wood in some form to a much greater extent than would new housing in congested areas, nor is it possible with the single unit to approach the efficiency of materials use attained in apartment construction. The distribution of electrical energy and telephone service is requiring, and will continue to require, many more poles to serve this spreadout pattern than would be used to serve equal city populations, nor does there seem to be much possibility of using underground conduit systems beyond the downtown centers. Hunters, fishermen, and other recreationists may have to go further afield for their sport, for moving to suburbia has not reduced the desire and tradition of vacations away from home, nor will all the leisure hours of this typically industrial population be spent mowing the new lawn or shoveling snow from the homesite driveway.

As I see the amount of credit being used to build highways and homes, for factories and commercial buildings, for schools and television sets, automobiles and furniture, I cannot help but wonder if the Strip and its companions across the country won't in some way limit the capital available for development in other areas.

Within whatever boundaries one chooses for the Strip, there will be found islands of land that are at present and may continue to be more or less untouched. Perhaps the practical criteria to apply in locating the extent of the Strip is to determine whether or not land values and taxes on land have risen beyond the current productive capacities of the land for timber or for agricultural crops. I have followed Martin and rather arbitrarily included the two southwestern counties of Maine, York and Cumberland; the counties of Belknap, Hillsborough, Merrimac, Rockingham, and Strafford in New Hampshire; all of Massachusetts except Franklin and Berkshire Counties; all of Connecticut; and all of Rhode Island. For some reason our Connecticut press and news services have always taken keen interest in the relative poll of cattle and people in Vermont. I believe that it was only last fall that they reported that people for the first time outnumbered cows.

The U. S. Soil Conservation Service, in cooperation with state and federal agencies, has just completed a national survey generally referred to as the Soil and Water Inventory. That portion of the data dealing with forest lands—present and predicted—here in New England is shown in Table 1. Viewed as a whole, these statistics indicate that forested area in New England will increase during the next 15 years by about 401,000 acres, just about the present forested area in our smallest state. The rate of increase within the Strip will be slightly greater than outside, 1.8 percent as compared to 1.1 percent. The data presented includes all forested area, current and predicted, including protection forest and forest areas not open to commercial timber production for various other reasons.

The predicted figures include lands moving from agriculture to forest. Lands moving from forest to urban use have been deducted. With the exception of Worcester County in Massachusetts, forested acres are predicted to decline in all counties containing cities with populations of 150,000 or more. A decline is predicted for counties adjacent to the City of Boston.

I would now like to make a few comments on some factors that seem to me to be important to the subject, while noting that it is difficult for me, at least, to know whether the things we observe today indicate the true direction of a gale, or are merely gusts within a storm system.

Roads

As many authors and speakers have pointed out, the growth and spread of the city—the Strip—is primarily dependent upon transportation and very largely upon automotive transportation. Back in the late twenties and early thirties, our state legislative bodies became interested in "getting the farmer out of the mud" and the seeds of urban expansion were first sown. The farmer is out of the mud, in fact he is often out of farming. The late thirties brought the first of the toll highways, the Merritt Parkway. It brought Fairfield and New Haven Counties closer in time to Metropolitan New York. Toll and toll free highways in the forties and fifties linked all of the major cities of New England. As we begin the new decade, more than 1,250 miles of interstate highways are being planned for the next 10 years. These highways will cost an estimated $2,489,000,000, and will be high speed, limited access roads designed to move traffic efficiently between major points.

Better highways will certainly benefit the forest landowner and the forest industry. Time and distance have been major factors blocking good utilization, good integration of the possible products of our woodlands. The buying areas for the pulp, plywood, and lumber industries should expand markedly. It may be possible that plywood quality logs growing in

TABLE 1.—SUMMARIZED PRELIMINARY DATA DRAWN FROM THE NATIONAL INVENTORY OF SOIL AND WATER CONSERVATION NEEDS

	Total land area	Forest and woodland	
		Adopted estimate 1959	Expected in 1975
Maine	19,865,600	17,137,453	17,382,718
New Hampshire	5,770,900	4,278,247	4,336,822
Vermont	5,937,920	3,891,787	4,126,160
Massachusetts	5,034,880	3,324,719	3,242,997
Rhode Island	677,120	423,389	417,074
Connecticut	3,135,360	1,965,007	1,915,219
New England (Total)	40,421,780	31,020,602	31,420,990
Within Strip 32 Counties (Total)	11,099,540	7,405,099	7,540,339
Outside Strip 35 Counties (Total)	29,322,240	23,615,503	23,880,651

Connecticut or Rhode Island will not have to be sawn into railroad ties or dunnage lumber; that pulpwood growing in eastern and central Massachusetts may become a highly marketable product. The products of the industry will also be brought closer to the 30,000,000 consumers living in Megalopolis.

Some of the direct effects of highways will not be so beneficial from a forestry viewpoint. Highway engineers have developed their skills and equipment to the point that to paraphase the familiar, neither hill nor swamp nor wooded glen shall halt these swift servants of suburbia. In building one mile of superhighway, 20 or more acres of lands are removed from any other use. It can no longer absorb water, or support animal or plant life. An additional 50 acres included in the buffer strips can produce no crop and must be maintained to create pleasing esthetic effects for motorists hurrying along at 60 miles per hour. Under the game laws of some of our states, still another 125 acres per mile will be removed from the lands open to legal hunting. Nor will these strips reserved from hunting for safety reasons be effective game preserves. They are highly hazardous for game. A white tail buck and a speeding vehicle are not compatible.

Another threat to forest operations by limited access roads is in isolation by such roads of islands of woodland. A road of this type can pin acres of woodland between itself and a stream or river, or when traversing a steep slope between itself and the top of the ridge. Foresters and landowners should be alert to see that construction plans allow for the preservation of at least some of the normal access routes to all lands.

The Federal-Aid Highway Act of 1956 includes permissive legislation for expenditure of up to 1 percent of all funds to acquire lands other than road rights-of-way for the preservation of scenic effects. This, too, should be of interest to foresters.

Nobody Loves a Dump

The disposal of refuse in Megalopolis is a major problem. Just about the time most of the major cities had solved their pressing problems of garbage and refuse disposal, the population spread into the small towns began. This population was conditioned by urban living to refuse disposal as a public function. The small towns seldom had either capital or know-how to establish incinerator plants, land fill dumps, or sanitary trench dumps. Air pollution from open and burning dumps makes them most undesirable neighbors. Too often the town fathers have relegated dumps to the more remote wooded area to be found within the town, where they are more or less forgotten from the end of one fire season to the beginning of the next. In March and April, and during prolonged summer and fall droughts, these dumps become a real headache to forest fire suppression personnel. Less obvious is the damage done to the wildlife resources by the Norway rat, a sure inhabitant of unmanaged dumps.

Where towns do not provide a collection service, wooded areas —especially adjacent to roads out of sight of houses—rapidly become elongated dumps.

Peoples and Attitudes

I live on a little state forest in a town in eastern Connecticut. It is one of the towns that suffers from all the growing pains associated with urbanization. In 1940 the population was 907, at present about 6,000. I have a story that I like to tell, for I think it demonstrates one facet of the problem that foresters will meet in Megalopolis when dealing with people. In 1949, we experimentally treated some fence posts with zinc chloride. These posts were set in a fence line adjacent to a road over which a large percentage of the male population passed each weekday morning and evening on their day to and from work. One of the species used in the experiment was gray birch. My mailbox was also mounted on a gray birch post. During the year gray birch mailbox posts blossomed all over town. Being untreated, the next year they literally blossomed. The native population also observed the fence posts and I am sure condemned me for a fool for trying to fence in a pasture with gray birch posts. Their interest was not expressed until the fourth or fifth year, when a few began to ask, "What did you do to those posts to make them last so long?" Only one man, an engineer in an aircraft factory—he also operated a dairy farm—actually stopped and found out how to preserve gray birch for fence posts.

It seems to me that this behavior pattern is typical: city people are conditioned by urban living to accept, sometimes blindly, example and instruction; country folks are likely to feel self-sufficient and a little suspicious of new ideas, especially if presented by government. I know that in Connecticut, public foresters find landowners with urban background more frequently requesting their services and following their advice than do farmers.

Taxes and Land Values

In my town, just this year, a 105-acre farm sold for $40,000. The farm buildings are poor—in fact, their value did not influence the price offered, as they will be torn down. The open land is worn out, the woodland is in poor condition. It would be hard to imagine anyone making more than a marginal living from operating the land as a farm. This sale will, however, subtly affect the asking price of all lands within the town, and also the assessed values of lands for tax purposes. Thirty years ago, property such as this could be purchased in the same town for $3 to $5 per acre.

Until the spread of urban populations, taxes and land values in the typical New England town were tied quite closely to the productive capacity of the land, or of the small shop or factory. This was true as long as the majority of votes were in the hands of people whose livelihood was gained from within the town. With the outward spread of urban populations, this majority has passed to voters whose chief source of income is from the sale of skills and professions, or from investments in areas remote

from their homes.

These people are conditioned to the high land values of cities, and to the many services that cities have offered their citizens. In their new surroundings, they are demanding better schools, better roads, uninterrupted electrical and telephone service, better mail delivery, garbage collection, police and fire protection, and recreational facilities.

There are few signs that land is overly inflated in value, however, for there is little tax delinquent land, nor does property change hands any more frequently than it did in past years. It does seem, however, that the average size of farm and woodland holdings grows smaller each year. In Connecticut, at least, there has been very little putting together of larger holdings in the past 10 or 15 years. There have been no substantial additions to state forest lands; no large increase to watershed holdings; and no large estates or game clubs have been developed. Most of this puting together of small holdings into a single ownership pattern seems to have passed.

There are many more factors and problems that should be at least touched upon.

A very major problem is how timber production may be adjusted to fit into a multiple-use program, especially as related to small ownerships. Are longer rotations and shorter cutting cycles indicated? Is watershed management compatible with timber and game management, and are the latter two compatible with each other? What about recreation in all its varied forms of out-of-door activities? Do town and regional planners ever really consider the hows and whys of timber and wildlife values, or, when they do consider forest land, are they mostly concerned with esthetics?

What part do soils play in determining the forest lands that will be urbanized, and the agricultural lands that will be forested? Would a better understanding of soils aid foresters in planning long range investments in cultural practices within the forests of Megalopolis?

Should more of the forest lands be in public ownership? Are the forest tax laws now included in our states' statutes effective? Does the forest landowner need or want tax relief, and, if so, will he accept some form of regulation? What about land easements used in some European countries?

Will new forest industry be hindered or restricted in Megalopolis by zoning rules against noise, or water, soil, and air pollution? How will Megalopolis withstand an economic recession? Does the urbanite really want to live in the country, or will urban redevelopment hold him in or draw him back to the city?

When one deals almost exclusively with problems, there is danger of acquiring the label of pessimist. As far as I am concerned, nothing could be further from the truth, for I see a firm future for forests and foresters within the Strip. Approximately two-thirds of the land area is now in forest and will continue in forest for the next 15 years or more. These forests will serve the people of Megalopolis well and in many ways, and I believe that foresters should and will be the primary land managers of this area.

Notes & Observations

Natural Selection in Loblolly Pine Stands

Some southern pine breeders are prone to discredit the genetic quality of naturally grown trees. This jaundiced view stems partly from the difficulty foresters experience in finding superior trees for their breeding programs. But before we underestimate the vigor of naturally grown trees, we should examine the intensity of natural selection occurring in each pine generation. None of us has had time to measure this, but enough data are available from various sources to make a fair approximation.

The tendency for large populations to remain genetically stable is the basis for the Hardy-Weinberg Law. Falconer (*2*) states it this way: "In a large random-mating population both gene frequencies and genotype frequencies are constant from generation to generation, in the absence of migration, mutation, and selection, and the genotype frequencies are determined by the gene frequencies." He goes further and lists the conditions on which the Hardy-Weinberg equilibrium depends as: ". . . random mating among the parents of the individuals, equal fertility of the different genotypes among the parents, and equal viability of the different genotypes among the offspring from fertilization up to the time of observation. In addition, the classification of individuals as to genotype must have been correctly made." It is readily apparent that in dense natural forest stands and stands under management some of the conditions upon which genetic equilibrium depends are not present because of natural and artificial selection for rate of growth, resistance to pests, and seed production.

Natural selection, or the effect of the environment upon the frequency of different alleles within a population, begins as soon as the environment affects the survival

TABLE 1.—POPULATION CHANGES THROUGHOUT THE LIFE OF WELL-STOCKED LOBLOLLY PINE STANDS—SITE INDEX 90

Sound seedfall per acre	Site preparation[1]	Trees per acre		Ratio column 4 to column 3
		Age 3[2]	Age 60[3]	
Thousands	*Method*	*Number*	*Number*	
10	Logged	872	150	1:6
10	Disked + Logged	1,231	150	1:8
50	Logged	4,360	150	1:29
50	Disked +Logged	6,155	150	1:41
100	Logged	8,720	150	1:58
100	Disked + Logged	12,310	150	1:82

[1]Cull hardwoods controlled on all sites.
[2]Computed from data by Trousdell (*4*).
[3]According to Schumacher and Coile (*3*).

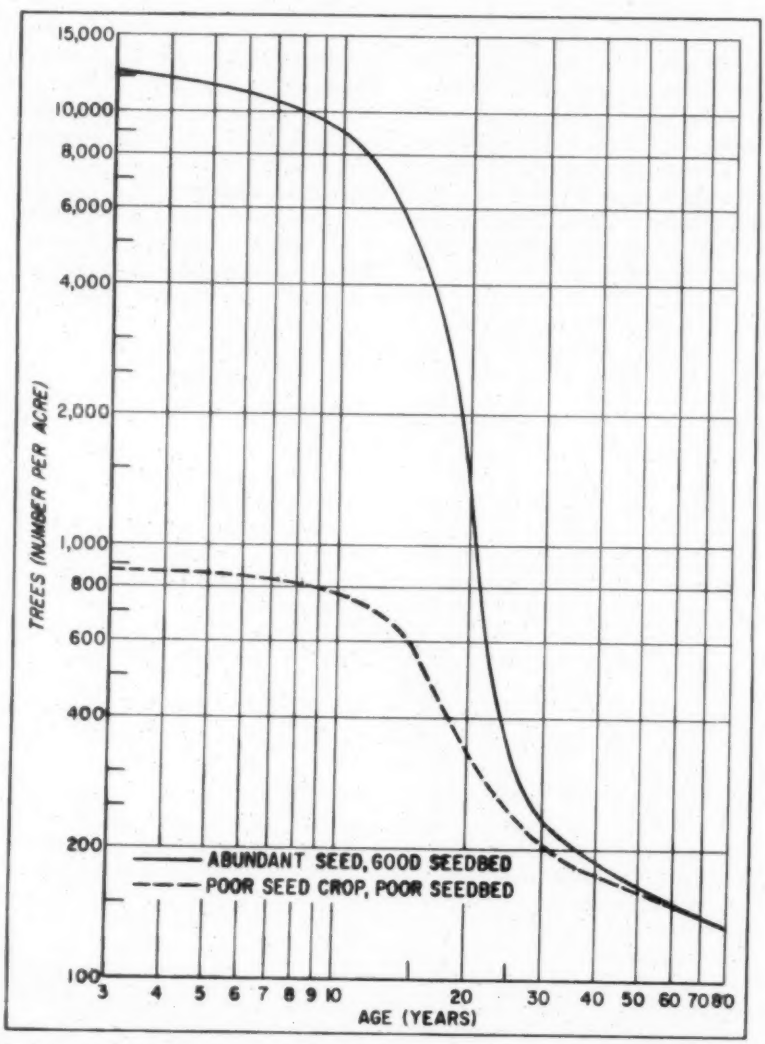

FIG. 1.—Theoretical populations of loblolly pine in stands of different ages on a good site with cull hardwood control.

and reproduction of individuals. Thus, selection occurs when plants with one allele for a particular character do not survive as well as plants with other allele(s) for this character. For example, if fast-growing trees tend to live longer and produce more seed than slow-growing individuals within a genetic population, the proportions of alleles affecting growth rate will tend to change through the years in favor of the alleles for faster growth.

Natural selection is generally far less efficient than well-planned breeding programs, particularly where the traits desired by the forester, such as form and wood quality, have little survival value. However, growth rate is one character which foresters are improving on after natural selection has occurred for thousands of years.

To approximate the extent of natural selection for growth rate, we can take a simplified example of one generation of pine. We are all familiar with the general shape of a population curve throughout the life of a well-stocked stand. Many seedlings start but only a few survive to maturity. Such generalized populations are portrayed in Figure 1.

Now, let us take an example of a southern pine. Since loblolly pine (*Pinus taeda* L.) is widespread geographically and the most abundant southern pine, this species will serve as a good illustration. Information for it on the Atlantic coastal plain is available for seed production (*1*), seedling establishment (*4*), and the growth and yield of natural stands (*3*).

In Table 1 information from these sources has been compiled to show the relative numbers of seed (in poor, satisfactory, and good seed years), number of established seedlings (at age 3), and number of trees at maturity (for convenience 60 years was used). These data are for a stand on a 90-foot site. Poorer sites would tend to have somewhat fewer seed and more stems at maturity. In this example the number of seedlings established is affected more by seed supply than by site preparation.

Undoubtedly there is some favorable selection for vigor before age 3, but vigor is probably of predominant survival value after that age. Therefore, the ratios of mature trees to 3-year-old seedlings in Table 1 point out the effect of natural selection through competition in well-stocked stands. With more individuals at age 3, there is not only a better chance that slow-growing trees will be eliminated early from the population, but also that outstanding individuals will occur.

How important is this selection? According to the data in Table 1, its importance varies greatly with seedfall. Note that with a poor seed crop and no other site preparation than logging and hardwood control less than 900 seedlings become established and 1 out of about 6 of these probably survives to maturity. On the other hand, with a good seed year on this site, about 8,700 seedlings become established and only 1 seedling out of nearly 60 survives to maturity.

Not all of this mortality is of selective value, of course; spacing and differences in microhabitat are important. But, on the average, the most vigorous of the established seedlings will survive.

Because we know little about the factors affecting the development of pine stands earlier than a few centuries ago, we cannot safely extrapolate conclusions about the sum effect of natural selection through the millenia. We can apply this information to our present management practices, though. The intensive site preparation techniques now employed not only tend to establish well-stocked stands; they also tend to improve the average genetic quality of the successful competitors. If early thinning is delayed until inherent growth differences become apparent and seed sources are selected from among the best trees, the future forester's ability to practice genetic improvement in the field may be significant.

This example should serve to point out that a large proportion of the trees have failed to compete and have thus been weeded out already. We foresters should never forget that nature had done quite a bit of culling before we arrived on the scene with our large increment borers clasped in our fists.

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California Forest Practices Act Enforcement

California's professional foresters and wildlife conservationists —and sportsmen as well—are encouraged with the results obtained in a recent hearing before an officer of the State Office of Administrative Procedures in Eureka, Humboldt County. Five Eureka-Arcata area logging operators, found guilty of several violations of the California Forest Practices Act, suffered revocation of their timber-operating permits effective June 27, 1961.

The northwestern California area involved in the particular violations was the western slopes of the upper middle reaches of the Mad River, where several hundred acres of Douglas-fir were being logged.

DeWitt Nelson, director of the State's Department of Natural Resources, said all the operators had followed illegal cutting and logging practices, and failed to fall snags; four of the operators also failed to comply with minimum soil-erosion requirements; and in addition, two of the companies failed to file fire plans. All were charged with violations of the Pine and Fir Forest District rules.

One of the most serious charges was failure to provide water-breaks to divert runoff water on steep skid trails in several locations. The trails were from 300 feet to 1,000 feet in length on exceedingly steep

hillsides, and the resultant soil erosion formed gullies from six to eight feet in depth, endangering the watershed. The soil thus displaced contaminated spawning and nursery areas of the Mad River formerly productive of silver salmon and steelhead.

State Fish and Game Department surveys show that virtually every major silver salmon and steelhead spawning stream in northern California has been damaged in varying degree by careless or irresponsible logging techniques. In addition to the Mad River, these would include the Klamath, Eel, Trinity, Van Duzen, Bear, Mattole, Smith, Ten-Mile, Noyo, Big, Navarro, Garcia, Gualala, Russian, and San Lorenzo River drainage areas. Of these, a small number, like the Gualala, have had fish production so drastically slashed that it is only about 60 percent of former output.

The California Forest Practices Act has been in effect for thirteen years, but its enforcement provisions are so weak that this is the first case which has been brought before a hearing officer for a ruling. It is not yet known whether the operators will appeal their conviction to a higher judicial body.

Officials of the State Department of Natural Resources, the Division of Forestry, and the Department of Fish and Game state that they would welcome such a test, since it would strengthen the present act if this conviction were upheld, or emphasize the need for its revision as to injunctive and punitive provisions, if the conviction were overruled.

Complaints of similar logging violations in other areas of California are at present being processed by the office of the state attorney general for future presentation.

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Growing Cottonwood Seedlings[1]

Currently, there is increasing interest in establishing eastern cottonwood (*Populus deltoides* Bartr.) plantations for timber production. This interest reflects the many desirable qualities of the species, such as very rapid growth, hardiness, and versatility in utilization. In the past, cuttings have usually been recommended for use in plantation establishment because they can be produced easily and are simple to plant. However, seedling stock of large size (3 to 4 feet in height) is advantageous for cottonwood plantation establishment on sites with heavy vegetative competition. Also, current efforts to improve the species genetically require the use of seedling stock. Stock of seedling origin has not been widely used for these purposes, because attempts to produce such stock frequently had met with failure. Consequently, there is fairly widespread belief that cottonwood seedlings are difficult to grow.

We have successfully grown excellent cottonwood planting stock from seed for 4 consecutive years, using minor modifications of essentially routine nursery practices. Extraction of the seed, trench irrigation, and similar time-consuming and difficult practices were omitted. The procedure used may be of interest to foresters, geneticists, and nursery operators producing or wishing to produce cottonwood seedlings.

The catkins were gathered from the ground when more than half the capsules were open. These catkins and partially-opened capsules were immediately spread by hand on a freshly-raked nursery seedbed which had been treated with methyl bromide or milon 50D, commonly-used soil fumigants. The seedbed was then raked lightly, and watered with a sprinkling can. Lath snow fence was placed over the side boards of the seedbed, so that the fencing was approximately 4 inches above the soil surface.

Daily light sprinkling in the afternoon was continued for 10 days, except on days when precipitation occurred. During the rest of the growing season, watering by overhead sprinklers was included in the regular nursery routine. Germination occurred within 2 to 3 days after sowing. Two weeks after sowing, the snow fence was removed to reduce the possibility of losses from damping-off.

For a 30-foot length of standard width seedbed, the labor expended included a half hour collecting the seed, another half hour sowing, raking, watering, and covering with snow fence, and approximately 2 hours for the 10 days of watering and removal of the fencing. Thus, costs of seedlings have been low.

This simple procedure has produced an average of 12 vigorous seedlings per square foot of seedbed. The seedlings have averaged 30 inches in height at the end of the first growing season, which is an adequate size for planting under the usual difficult conditions encountered on many sites where cottonwood establishment is desired.

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[1]Journal Article 2765 from the Mich. Agric. Expt. Sta. The authors are indebted to W. I. Bull and J. W. Wright for assistance in this project.

Points of View

The "Farm Woodlot" Revisited

A recent article[1] in the JOURNAL summarizes the results of a series of Forest Service exploratory studies concerned with the characteristics, attitudes, and motivations of owners who control private forest properties of less than 5,000 acres. The article points out that "although farmers were more numerous than other occupational classes there was not always a clear-cut majority and a considerable number of owners classified themselves as business-professional or wage earner-clerical." Examination of the data presented in Table 1 of the article shows that farmers constituted over one-half of the small private forest ownership population in only three of the nine study areas, and in general were a minority ownership component.

This situation now seems to prevail in many areas, including here in the Lake States. In four recent studies covering wide areas, active farmers predominated among small forest owners (and only by a scant margin) in only one area. Even in a prosperous farming area such as the southern part of the Lower Peninsula of Michigan, farmer-owners of forest tracts were outnumbered by nonfarmers.

Is this only a minor academic point? I think not. For several decades the forestry profession's concern with small forest ownerships largely has been within the context that this problem was a farm woodlot problem. Illustrative of this approach are the large number of studies and publications dealing with overgrazed woodlots, supplementing farm incomes through the sale of forest products, marketing timber through farmer co-ops, etc. Except for the state-federal service forestry programs, public assistance largely has been channeled through farm-oriented agencies.

While the farmer group and farm woodlots will occupy a significant niche in this small forest ownership group for years to come, it is time that we begin adjusting our viewpoint in terms of the changing nature of the small ownership population.

Since World War II new factors have entered the picture. The rise of the farm "problem" in terms of static or declining farm incomes compared to that from other sections of the national economy, together with increased employment versatility provided by rising levels of education, has speeded up the migration of farm youth to urban areas or to nonfarm employment. Since 1956 the Soil Bank program has inactivated many farms and permitted their owners to retire or to move into other employment. Countering this off-farm movement has been the recent accelerated trend in the acquisition of farms or other rural properties by urbanites for recreation, week-end, and residential purposes. Examine the rural ownership population in an arc about any of our large urban centers (and quite frequently about smaller ones as well) and the large extent of this phenomenon becomes quite obvious.

These nonfarmer owners provide a new challenge to forestry policymakers attempting to solve small woodland problems. A quite different group from the farmers, they may have to be approached on a different basis.

While the prospect of periodically receiving several hundred dollars of additional income from the sale of timber or timber products may strike a marginal farmer as being attractive, it may provide a much smaller appeal to a busy medical doctor, lawyer, or other nonfarmer owner with a comfortable income source. On the other hand, the nonfarmer may show greater interest in the more altruistic and less tangible aspects of forest property ownership such as the role of the forest as a habitat for wildlife (which frequently can be improved through a program of sound timber management), or as a provider of raw material to a prosperous and stable local timber economy. Obviously not all nonfarmer owners will make such value judgments, but even when the owner is an ex-farmer, now retired or employed in town, there are apt to be changed patterns of motivation and forest use. The woodpile gives way to oil heat and, with the farm in the Soil Bank or otherwise inactive, there may no longer be need to cut fence posts to keep up fences, etc.

Again, in the matter of inputs there may be significant implications. While the resident farmer may have had both the desire and time to do offseason woods work, the nonfarmer may not. With the host of activities available for contemporary man's leisure time as well as the demands made by family and community, the extent to which personal forest management activities could be carried out is limited—at least for the owner who does not view forestry as an interesting week-end hobby. On the other side of the scale may be a more favorable personal financial position which would permit some nonfarmer owners to make investments in their woodlands in the form of hired labor or other purchased inputs. Along these lines, an interesting new feature of the rural land market here in the Lake States is the advertising and sale of 40- or 80-acre tracts of land wholly or partially planted to young conifers as tree farms. The outlet for such offerings generally consists of urbanites attracted to ownership by investment, recreational, or mixed motives.

One other favorable aspect, again involved with the owner's asset

[1]McClay, T. A. Similarities among owners of small private forest properties in nine eastern localities. Jour. Forestry 59:88-92. 1961.

position, concerns the pressure on small woodlands because of an owner's chronic or emergency need for funds. This sometimes has been cited as the crux of the small woodland ownership problem and one of the main reasons why such holdings often are prematurely and destructively logged. Ownership shifting from marginal farmers to financially stable owners might reduce this problem aspect.

These are but a few implications of the changing ownership situation. There are many more. In summary, this writer does not believe that the farm woodlot is going down the road to extinction, but rather that foresters concerned with forestry programs and policy planning should keep in mind that in many geographic areas the farmer no longer is "down on the farm." The changing composition of the small ownership population suggests that we may have to critically re-evalute our over-all thinking. Yesterday's programs may prove inadequate for tomorrow's conditions.

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The Fifth Year—A Dissent

There has been much discussion proposing a five-year undergraduate program to correct the lack of breadth and depth in the collegiate education of foresters. If we add a year to undergraduate training we are, in effect, giving the seal of approval to the great number of primary and secondary schools that are carrying our young people on at a snail's pace. We are encouraging lazy, lackadaisical habits in both students and teachers.

It is ridiculous for students to take such courses as English composition, algebra, trigonometry, chemistry, physics, botany, history, and government in secondary school and repeat essentially the same courses in college. I judge from reading A Report to the Faculty on the Program of Advanced Standing by Edward T. Wilcox dated April 1, 1959, that Harvard College thinks it is ridiculous, too. There are those who think Harvard is a sound institution, yet the school admits as freshmen some able students with eleven years of good primary and secondary school training. It admits as sophomores some able students who have completed good secondary school training.

I propose no such radical programs for wide adoption as those of Harvard, However, in admittedly going to five years we are doing good students and good schools a grave disservice. I propose a more indirect (devious or sneaky, if you like) approach. Let us demand a certain proficiency in mathematics, English, chemistry, and whatever. Beyond this proficiency we have our forestry curriculum. If the student gains this proficiency in secondary school, he may earn his forestry degree in four years or less. If he gains this proficiency in college, it may take him five years or more to get his degree.

It may be politic and realistic to let the student acquire college credits in those prescribed fields if he pursues proficiency in them in college. These credits would not be part of those required for his forestry degree. And let us make it abundantly clear that we would not require him to have college credits as proof of proficiency.

The easy way out for us as planners and teachers and for our reluctant scholars is five years for the B.S. degree. But it is the intellectually dishonest way out. It is the way out which will result inevitably in the primary and secondary schools (and the colleges, too) offering our youth more and more pap.

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Results of the Fifth World Forestry Congress Reviewed

W. Mann, Editor. Allgemeine Forstzeitschrift. Munich, Germany. Vol. 16, No. 1. Special Issue. January 1961.

This excellent account of the Forestry Congress at Seattle last fall is evidence that it made a deep impression on all who attended it, perhaps the Germans particularly, and that this impression was lasting. In forty well illustrated pages, this special issue records the results and comments on what was observed there.

The opening account is by Dr. Mann of Bonn, then follow accounts by Dr. Weisgerber of Wiesbaden on the U. S. forest administration as viewed by a German; by Dr. Speer of Munich on the conservation reserve; by Dr. Abetz of Freiburg on farm forestry in the U. S. (very favorable); and by Dr. Mantel (Freiburg) on recreation which is rather critical of U. S. policies.

Prince Ludwig of Baden's article "A Young Forester Sees America" will please our readers as he was favorably impressed. Dr. Langner contributes a thorough article on genetics research as practiced in the U. S. There are numerous other articles: on soils by Dr. Wittlich of Hann-Munden; silvicides by Dr. Hesmer of Bonn; inventory by Dr. Hildebrandt of Freiburg (he was most impressed by photogrammetric progress in the Northwest and Rockies); on forest protection by Drs. Becker (Berlin) and v. Scheller (Hann-Munden); on economics by Dr. Abetz, and on wood technology by Drs. Kollmann (Munich) and Knigge (Hann-Munden).

The center pages of this excellent review are photographs of logging in the Northwest, which greatly impressed the delegates, especially the high climber. Several authors think we overvalue the financial aspects (profit motive) of forestry.

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Book Reviews

Forest Management

By H. Arthur Meyer, Arthur B. Recknagel, Donald D. Stevenson, and Ronald A. Bartoo. 2nd Ed. v + 282 pp. Illus. The Ronald Press Company, New York. 1961. $8.50.

The reviewer would like to express the opinion that this is one of the better books on forest management that he has read in the past twenty years. As a successor to the first edition it far surpasses the usual rehash of material. One of its salient aspects is the very evident hand of those who are in constant contact with the day-to-day operations of a forest under management. The authors have cut away the underbrush of philosophy and theory of forest management and left the merchantable stems of applied management. Whether or not this is entirely for the best can become a moot question, depending upon whether the reader is a student, a practicing forester, or a professor of forest management.

This book is divided into four logical parts. Part I, Organization of Forest Property for Management, serves to delineate the tasks of forest management, the organization of the forest into various subdivisions, and emphasize the necessity for soil site and other classifications. Emphasis is also placed on the use of maps and various methods of inventory, growing stock, volume and growth determinations and mortality, all of which are necessary for an adequate understanding of the management to come.

The first two of the three chapters in Part II, Regulation, present an excellent discussion of one of the often neglected and misunderstood phases of forest management, namely, the recognition and distinction between the even-aged and uneven-aged forest. A good discussion of the structure, growth, and development of even-aged and uneven-aged stands and forests is included along with an adequate discussion of the various kinds of rotations usable in practical forest management. Some readers may disagree with the definitions and lack of distinction made between the technical rotation and the rotation of the largest volume production per acre per year, but such disagreement is not uncommon. The choice of rotation discussion is quite realistic.

The third chapter of Part II is devoted to regulation of the growing stock. The authors have selected those methods of regulating the cut considered to be most usable and adaptable to American forests. By the very inclusion of the practical aspects of the proposed regulation methods, the authors have done a great justice to the importance of regulating the cut in forestry in the United States. The day of the forester "flying by the seat of his pants" is over, and reliance entirely upon silviculture as a criteria for determining the amount of the cut is past. It is good to find a textbook that recognizes this fact.

Part III of the book adequately covers the need for forest management plans, with perhaps relatively more than necessary emphasis on farm woodland plans and reports, since most likely few actual forest management plans will be written for the small farm woodland. A brief, but good, outline for a forest management plan is included.

One of the outstanding facets of the book is its constant emphasis on the need for records, including an adequate accounting system and other business records. A simple and effective classification of accounts is presented in the text. Closely allied to this discussion of records is a chapter on The Forest as a Business Enterprise, which should be included in all textbooks on forest management.

The appendix, which makes up 23 percent of the book, consists of four forest management plans covering varying degrees of intensity of management. As explained by the authors the purpose of including the plans is ". . . to show what actual management plans look like and to exemplify the principles of management plans which the previous chapters have set forth." Considering the lack of training in this aspect of forest management in many schools of forestry today, this is an admirable objective. It again places emphasis on the progressive aspect of forestry.

One of the best features of the book from a teaching point of view is the list of references at the end of each chapter. Divided into two parts, it first gives a list of source references referred to, or pertaining to, the material covered in the chapter; and second, it gives a list of supplemental readings with appropriate comments as to the contents of each.

ARCHIE E. PATTERSON
School of Forestry, University of Georgia, Athens

The Lonely Land

By Sigurd F. Olson. x+273 pp. Illus. Alfred A. Knopf, Inc., New York. 1961. $4.50.

It is doubtful if anyone is better qualified to write of the canoe country than Sigurd F. Olson. Few have spent more time in the area and few have worked as hard for its preservation. A biologist by training, he served for several years as professor and dean of the Ely, Minnesota, Junior College — primarily, as many friends suspect, to be near the canoe country of the Boundary Waters Canoe Area of the Superior National Forest in Minnesota and the adjacent Quetico Provincial Park in Ontario. He now devotes full time to writ-

ing and serving as wilderness consultant to several outdoor organizations. In addition to numerous magazine articles, he has written *The Singing Wilderness* and *Listening Point*.

Mr. Olson is an avid student of the early voyageurs, who in the 18th Century traveled the northern wilderness, plying the fur trade and paving the way for the miners and loggers who were to come much later. *The Lonely Land* is a narrative account of a three-week retracing of a 500-mile portion of the ancient but little changed routes, much of which is still uncharted today.

Five expert canoe men, consisting of a career diplomat, an army general, a government official, and two business executives, together with the author who acted as Bourgeois, or leader, began their expedition at the ancient trading post on Ile á la Crosse. Travelling in three canoes, they navigated the treacherous upper portion of the Churchill River, crossed the Frog Portage to Sturgeon Weir River, and paddled down the Sturgeon Weir to the Saskatchewan River. The trip terminated at the historic Cumberland House, the first inland trading post established by the Hudson's Bay Company.

In his book, Mr. Olson gives the stay-at-home reader a day by day account of the party's experiences, from the breathtaking descent down treacherous rapids to the interesting minor adventures which helped lighten the otherwise long wearisome portages. The occasional Indian party and the mission priest encountered along the way could easily have been taken from the pages of a voyageur's diary of long ago. Each night at the end of the day's journey and after the evening chores were completed, the adventurers would read from the journals of George Simpson, Alexander Mackenzie, Philip Turnor, David Thompson, and other voyageurs who traveled the same routes and whose accounts closely parallel the experiences of their modern counterparts.

In *The Lonely Land*, Mr. Olson achieves his stated purpose: "To give the reader some feel of the land as we saw it . . . and share the joy and challenge of the wilderness, the sense of being a part of the country and of an era that was gone, the freedom we had known, silence, timelessness, beauty, companionship and loyalty, and the feeling of fullness and completion that was ours at the end."

DONALD H. FERGUSON
Duluth, Minn.

Yankee Loggers

By Stewart H. Holbrook. 124 pp. Illus. International Paper Company, New York 17, N. Y. 1961. No price indicated.

You don't have to be a Yankee or a logger to enjoy this one.

Subtitled *A Recollection of Woodsmen, Cooks, and River Drivers*, it is a truly fascinating account of a remarkable breed of men and their way of life in an era that has largely passed.

In his long and fruitful writing career, Stewart Holbrook has never been more vivid and informative. He has given the woods workers a kind of character that is almost heroic in its proportions. From a bygone age he brings them to life—not only the Yankees, but the French, the Scots, and the Irish who "let daylight into the swamp." You can almost smell the woods.

Those who enjoyed Holbrook's *Holy Old Mackinaw* will find this an extra dividend of the same stock. There is even a photograph of the "indescribable and immortal Jigger Johnson," a noted logging camp foreman, a figure now becoming almost legendary in the annals of the industry.

Holbrook has some complimentary comments on the personalities and work of the company foresters. He tells how the forester was first resented because he was an educated man, then tolerated, and finally accepted. His tribute to Austin Cary, the first industrial forester in New England, is as honest as it is deserved.

He makes the point that there was no forestry practiced by the northeastern industry until the advent of the pulp and paper mills. Then came protection from fire, followed by a crude sort of silviculture based on minimum diameter limits, and finally forest management of varying degrees of intensity.

Although published by International Paper Company, this book is concerned with numerous other companies and their operations. It is a companion volume in format and treatment to *The Forest is the Future* by Jonathan Daniels, published in 1957.

For both works, IP is to be commended. Books such as these are valuable contributions to the literature of forestry. Without the company's sponsorship it is doubtful if either would have been written.

HENRY CLEPPER

Our National Parks—A Critical History

By John Ise. 676 pp. Illus. Johns Hopkins Press, Baltimore, Md. 1961. $10.

Dr. John Ise has produced a masterful, critical history of our National Park Policy for Resources for the Future Inc. John Ise, in 1920, wrote his *United States Forest Policy*, and in 1926 his *United States Oil Policy* so *Our National Parks* is his third conservation study. The book is well documented with footnotes to original sources and to aid those who would like to make a more intensive study of the subject. It is a scholarly book that will be of great interest to professionals as well as the general readers who are interested in the field of conservation. In reading the book, you soon realize it is a product of many years of scholarly study and a firsthand knowledge of our national park system. It is a thoughtful analysis of the problems that have and still face our national parks. It deals especially well with the problems of special interest, pressure groups, wildlife policy, and the problems of private lands within the national parks. He has done an excellent job on the subject of financing of our national parks through all its complexities.

Our National Parks is divided into three parts with part one devoted to the early parks from 1872

to the founding of the National Park Service in 1916, covering some 169 pages. This part covers the founding and the early history of Yellowstone, Yosemite, Sequoia, General Grant, Mount Rainier, Mesa Verde, Glacier, Wind Cave, Sully's Hill, and Platt National Parks. In this section he also covers the early history of the national monuments.

Part two covers the National Park Service from 1916 to 1959 under each of the directors of the National Park Service and uses some 384 pages. This includes the Mather Administration from 1917 to 1928; the Albright Administration from 1929 to 1933; the Commerce Administration from 1933 to 1940; the Drury Administration from 1940 to 1951; and the Wirth Administration from 1951 to the present time.

Part three deals with special park problems. In this section of 96 pages Ise deals with the problems of wildlife, national park concessions, financing, wilderness areas, as well as national parks in other countries.

The author has included maps of national parks and the adjoining national forests, national monuments, Indian reservations, and Canadian national parks. These maps are of Yellowstone, Yosemite, Sequoia and Kings Canyon, Mount Rainier, Crater Lake, Mesa Verde, Glacier, Grand Canyon, Grand Teton, and Olympic National Parks. Inside the front and back covers is a map of the United States proper, Alaska, Hawaii, Puerto Rico, and the Virgin Islands locating the national parks in these areas.

All those interested in the conservation field should thank John Ise and Resources for the Future Inc. for adding this outstanding book to our conservation literature.

KARL DRESSEL
Michigan State University, East Lansing

Mammals of Wisconsin

By Hartley T. Jackson. xii + 504 pp. Illus. The University of Wisconsin Press, Madison. 1961. $12.

This comprehensive scientific treatise is a valuable reference for foresters and biologists. While it is of primary interest to the mammalogist, the author has presented his material very clearly and interestingly; its appeal is not limited to this group. He has included stories of unusual observations and events which clarify the characteristics of the lesser-known species and hold the reader's interest.

The book is liberally illustrated with 220 photographs, 154 line drawings, and 80 maps. The photographs of living animals, preserved specimens, detailed identification characteristics, and a limited number of animal signs are excellent. The line drawings generally do not meet the same high standards of the photographic illustrations. Readers might experience difficulties in identifying animal signs from the illustrations on seats, gnawing work, and tracks. Only individual footprints, rather than track patterns, are generally shown. The maps show mammal collection records and distribution of individual species in Wisconsin and in most cases a smaller scale inset map showing the range of the species in North America. Each animal species is treated under the following major headings: Vernacular or common names, identification marks, measurements, distribution in Wisconsin, habitat, and status and habits.

The economic damage aspects of rodents, browsers, and predators are recognized to some extent, but generally economic losses are minimized or justified on the basis of positive values. The problem of balancing white-tailed deer numbers with available food is discussed. The need for sportsmen's understanding and support of deer management programs is emphasized.

Hartley T. Jackson has served the U. S. Biological Survey and its successor, the U. S. Fish and Wildlife Service, for over 30 years. He began his extensive studies of the mammals of his home State of Wisconsin in 1912. His periodic field trips to the state for gathering information have been supplemented by his co-workers in these agencies. The University of Wisconsin and other institutions and individuals have cooperated in this effort. The result is a book which will be appreciated by all who must work with wild animals and need to know more about them. Its value is not limited to the State of Wisconsin.

HERMAN F. OLSON
Milwaukee, Wis.

Publications of Interest

The National Science Foundation has released a report, *Professional Manpower and Education in Communist China*, which sees that country's scientific effort geared to meet immediate technological demands, its education undergoing rapid change and expansion, and its development as a major industrial power handicapped by its population problem. The report was prepared under a Foundation grant to the Library of Congress, and is the result of two years of analysis and evaluation of material on the mainland China.

Copies may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at $2 each.

* * *

Bulletin 41, *Bird Mortality in the Dutch Elm Disease Program in Michigan*, has just been issued by the Cranbrook Institute of Science, Bloomfield Hills, Mich. The 44-page bulletin describes the early history of the disease, mortality and the disease in the Detroit area, the 1960 spring die-off of robins at East Lansing, analysis of specimens, survey of mortality by communities, annotated list of species, and conclusions and recommendations.

* * *

The Watershed Management Committee of the Columbia River Section of the SAF has prepared and recently published a 16-page bulletin, *Watershed Protection—A Manual for Forest Landowners*. Committee Chairman was William Farrell of Oregon State University, Corvallis. The manual represents several years work by the committee and emphasizes the importance of water resources and deals with forest management and harvesting practices for their protection. The bulletin is printed by the College Press, Oregon State University; no price indicated.

Current Literature

Compiled by LOIS MCALLISTER, *Assistant Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

Care of Ornamental Plants. By W. R. Garren and Others. 40 pp. Illus. Clemson College, Extension Service, Clemson, S. C. 1961. Cir. No. 430.

Garden Shrubs and Trees. By S. G. Harrison. 318 pp. Illus. St. Martin's Press, Inc., New York 10, N. Y. 1961. The Kew Series, v. 4. $4.95.

Forestry for Minnesota Schools. By Minnesota Division of Forestry. 74 pp. Illus. 1961. Available from Minnesota Education Assoc., 41 Sherburne Ave., St. Paul 3, Minn. $1.25.

A History of the United States Weather Bureau. By D. R. Whitnah. 267 pp. Illus. University of Illinois Press, Urbana. 1961. $6.

Ornamentals for Low-Elevation Desert Areas of Southern California. By M. E. Mathias and Others. 36 pp. Illus. California Agric. Expt. Sta., Extension Service, Berkeley. 1961. Cir. No. 496.

Readings in the History of American Agriculture. By W. B. Rasmussen. 340 pp. Illus. University of Illinois Press, Urbana. 1960. $6.50.

Christmas Trees

Christmas Tree Growers Associations. Compiled by A. M. Sowder. 3 pp. Extension Service, U. S. Dept. of Agriculture, Washington 25, D. C. 1961.

The Shaping of Pine Trees by Pruning and Shearing. By H. C. Larsson. 36 pp. Illus. Ontario Dept. of Lands and Forests, Division of Research, Ottawa, Canada. 1960. Research Report No. 43.

Forest Influences

Research and A Land Management Model for Southern California Watersheds. By Walt Hopkins, Jay Bentley, and Ray Rice. 12 pp. Illus. Pacific Southwest Forest and Range Expt. Sta., Berkeley, Calif. 1961. Misc. Paper No. 56.

Snow Accumulation and Melt under Certain Forest Conditions in the Adirondacks. By H. W. Lull and F. M. Rushmore. 16 pp. Illus. Northeastern Forest Expt. Sta., Upper Darby, Pa. 1960. Sta. Paper No. 138.

Water for Man. By S. A. Taylor. 29 pp. Illus. Utah State University, Faculty Assoc., Logan. 1961. Faculty Honor Lecture No. 23.

Forest Management

Growth and Development of Red Alder Compared with Conifers in 30-Year-Old Stands. By C. M. Berntsen. 20 pp. Illus. Pacific Northwest Forest and Range Expt. Sta., Porltand, Ore. 1961. Research Paper No. 38.

Initial Forest Management in the Tennessee Valley. By K. J. Seigworth and J. H. Barton. 150 pp. Illus. Tennessee Valley Authority, Division of Forestry Relations, Norris. 1961.

Forest Resources

Florida's Timber. By R. W. Larson and M. H. Goforth. 32, [55] pp. Tables. Southeastern Forest Expt. Sta., Asheville, N. C. 1961. Forest Survey Release No. 57.

Logging and Milling

Computing Average Log Values for Timber Appraisals Using IBM 650 or Univac Solid State 80 Computers. By G. D. Frazier and R. B. Carney. 16 pp. Charts. Pacific Southwest Forest and Range Expt. Sta., Berkeley, Calif. 1961. Tech. Paper No. 54.

Pathology

Deterioration—A Pathological Aspect of Second-Growth Management in the Pacific Northwest. By K. R. Shea. 14 pp. Tables, charts. Weyerhaeuser Co., Forestry Research Center, Centralia, Wash. 1960. Forestry Research Note No. 28.

Oak Wilt in West Virginia. By R. P. True and Others. 119 pp. Illus. West Virginia Agric. Expt. Sta., Morgantown. 1960. Bul. No. 448T.

Wetwood, Bacteria, and Increased pH in Trees. By Carl Hartley, R. W. Davidson, and B. S. Crandall. 34 pp. Illus. U. S. Forest Products Lab., Madison 5, Wis. 1961. FPL Rept. No. 2215.

Protection

Burning Index as a Partial Guide to Air Patrol in the South. By R. M. Nelson. 11 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1961. Sta. Paper No. 118.

Litter-and-Duff Fuel in Shortleaf Pine Stands in Southeast Missouri. By J. S. Crosby. 10 pp. Illus. Central States Forest Expt. Sta., Columbus, Ohio. 1961. Tech. Paper No. 178.

Range Management

Chemical Control of Brush and Trees. By R. Behrens and Others. 23 pp. Illus. U. S. Department of Agriculture, Washington, D. C. Apr. 1961. Farmers' Bul. No. 2158. 15 Cents. (Govt. Print. Off.)

Ecological Research Findings on the Annual Grass Type at the Hopkins Field Station. By H. F. Heady. 4 pp. California Univ. School of Forestry. Forest Products Lab., Berkeley. Mar. 1961. Calif. Forestry & For. Products No. 24.

Effect of Combined Endrin-Arasan 75 and Thiourea Treatments on the Germination of Bitterbrush Seed. By R. Sanderson and D. McIntosh. 7 pp. Pacific Southwest Forest and Range Expt. Sta., Berkeley, Calif. Feb. 1961. Res. Note No. 174.

The Effect of Length of Rest Period and Length of Harvest Period on Yield and Survival of Forage Crops. By R. R. Davis and J. L. Parsons. 23 pp. Tables. Ohio Agric. Expt. Sta., Wooster. Apr. 1961. Res. Cir. No. 99.

Fertilization and Soil Test Studies on Common and Coastal Bermudagrass. By L. H. Hileman and Others. 40 pp. Arkansas Agric. Expt. Sta., Fayetteville. Feb. 1961. Bul. No. 637.

Production and Forage Preference on Subalpine Sheep Ranges of the Bighorn National Forest, Wyoming. By M. May. 8 pp. Rocky Mountain Forest and Range Expt. Sta., Fort Collins, Colo. Dec. 1960. Res. Notes No. 53.

Range Practices that Help Prevent Water-Belly. By K. G. Parker. 8 pp. Illus. Montana State College, Coop. Exten. Serv., Bozeman. Mar. 1961. Circ. 278.

Response of Fescue to Natural Moisture Gradient on an Artifical Slope. By J. D. Hewlett. 2 pp. Southeastern Forest Expt. Sta., Asheville, N. C., Jan. 1961. Res. Notes No. 152.

Silviculture

Development of Immature Balsam Fir Following Crown Release. By G. L. Baskerville. 15 pp. Illus. Canada Dept. of Forestry, Forest Research Division, Ottawa. 1961. Tech. Note No. 101.

Germination of Eastern White Pine Seed and Early Establishment of White Pine Seedlings on Prepared Sites. By H. W. Hocker, Jr. 15 pp. Tables. New Hampshire Agric. Expt. Sta., Durham. 1961. Sta. Tech. Bul. No. 103.

Soil Site Index for Georgia Slash Pine. By C. E. McGee. 9 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1961. Sta. Paper No. 119.

Wood Preservation

Kiln-Drying of Lumber in Eastern Canada. By R. S. Millett. 37 pp. Illus. Canada Forest Products Research Branch, Ottawa. 1961. Tech. Note No. 21.

South Atlantic Wood Pole Conference, April 5-6, 1961. 183 pp. Illus. North Carolina State College, Raleigh. 1961.

Wood Technology and Utilization

Design of Containers and Interior Packing. By J. M. Rudnicki. 31 pp. Illus. Canada Dept. of Forestry, Forest Products Research Branch, Ottawa. 1961. Tech. Note No. 22.

Properties and Utilization of Canadian Poplars. By J. D. Irwin and J. A. Doyle. 28 pp. Illus. Canada Forest Products Research Branch, Ottawa. 1961. Tech. Note No. 24.

Pulping of Asian and Australasian Wood and Plant Fiber. By G. H. Chidester and E. R. Schafer. 14 pp. Tables. U. S. Forest Products Lab., Madison 5, Wis. 1961. FPL Rept. No. 2211.

Suitability of Some Pacific Coast Woods for Printing Papers. By D. J. Fahey and J. S. Martin. 16 pp. Tables. U. S. Forest Products Lab., Madison 5, Wis. 1961. FPL Rept. No. 2200.

Society Affairs

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1960-1961

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413 Daly Avenue
Missoula, Mont.

Combined Annual Meeting
Canadian Institute of Forestry and Society of American Foresters
Minneapolis, Minn., October 8-11, 1961

"Forestry's Common Frontiers" is the theme for the international meeting of professional foresters in Minneapolis, October 8-11. This will be a joint meeting of the Society of American Foresters and the Canadian Institute of Forestry. About 1,000 members and wives are expected to attend.

A general session and ten technical sessions are scheduled covering all fields of forestry practice. About 70 scientific and professional papers will be read.

This meeting provides an opportunity for foresters from the United States and Canada to exchange ideas and discuss progress in forest administration, research, and education. All friends of forestry are welcome whether or not they are members of the two professional societies.

The re-emerging forests of the Upper Great Lakes area, with their large areas under scientific management, will be the topic of many papers. Others will deal with forestry problems and plans throughout North America. Post-meeting tours are arranged to see interesting forestry activities in the Lake States.

Ladies Activities

A special lounge will be available as hospitality headquarters for ladies throughout the meeting. There will be special hostesses for all activities.

Registration of ladies will open on Sunday afternoon, October 8, and continue into the evening. There will be an afternoon tea.

On Monday morning, October 9, there will be a kaffee-klatsch. The afternoon is for shopping and excursions. The following have been arranged:

Southdale, the Twin Cities shopping center, surrounding a covered plaza.

Midwest Furniture showrooms, featuring an interesting display of home furnishings.

Contemporary and traditional furniture showrooms; unusual furniture including designs from Paul McCobb.

Dayton's Department Store and informal modeling in Dayton's Skyroom restaurant.

Tuesday, October 10, is Tour Day. Ladies will have the choice of three tours, all by bus, as follows:

1. Ann Pillsbury Kitchens, the Planetarium, lunch in the Waikiki Room, and the American Swedish Institute; Minneapolis.
2. American Swedish Institute, lunch at Fair Oaks, and the Minneapolis Institute of Arts or the Historical Society; Minneapolis.
3. Ford Assembly plant, lunch at Coleman's, the Sibley House, and the State Capitol; St. Paul.

On Tuesday evening, the ladies are invited to attend the smorgasbord and social evening.

Wednesday, October 11, will feature a luncheon at the Interlachen Country Club, preceded by a social hour and followed by the noted entertainer of the Midwest, Mrs. Carol Seagren. Transportation will be by bus; the

trip will go and return through the parks and lake district of Minneapolis.

On Wednesday evening there will be a social hour and the joint annual CIF-SAF dinner.

General Meeting
Monday morning, October 9

Carl H. Stoltenberg, Chairman
Theme: "Forestry's Common Frontiers"

1. Welcome by Charles A. Connaughton, president of the Society of American Foresters.
2. Response by H. J. Hodgins, president of the Canadian Institute of Forestry.
3. "Forestry—Between Past and Future." Harry S. Mosebrook, Weyerhaeuser Company, New York, N. Y.
4. "Forestry Perspectives." J. W. B. Sisam, Faculty of Forestry, University of Toronto, Toronto, Ont.

Society Affairs Session
Monday afternoon, October 9

Charles A. Connaughton, President
Henry J. Malsberger, Vice President
Henry Clepper, Executive Secretary

1. Report of the President.
2. Report of the Executive Secretary.
3. Report of the Editor of Society publications, Arthur B. Meyer.
4. Report of the Editor of *Forest Science*, John W. Duffield.
5. Report of the Committee for the Advancement of Forestry Education, Frank H. Kaufert.
6. Report of the Planning Committee, Lee M. James.
7. Report of the Committee on International Relations, V. L. Harper.
8. Report of the Committee for the Study of Education, Henry J. Vaux.
9. Report of the Committee on Forestry Research, George M. Jemison.

Special Program on the Recreational Demands on Forests

This portion of the afternoon session will be devoted to a discussion of the impact of recreational demands on forests. Participation by the audience is invited.

CIF Business Meeting
Monday afternoon, October 9

H. J. Hodgins, President
Lowell Besley, Vice President
J. J. E. Dosne, Secretary-Manager

Agenda to be announced later.

Technical Session on Forest Management
Tuesday morning, October 10

Frank D. Irving, Chairman (SAF)
Symposium: Management Plans—The Path to the Future
F. S. McKinnon, Moderator (CIF)

1. "Government Working Plans in Eastern Canada." Murray Morison, Ontario Department of Lands and Forests, Toronto, Ont.
2. "The Company Forester's Viewpoint." Alan Moss, S. M. Simpson Ltd., Kelowna, B. C.
3. "Timber Management Planning on the National Forests." Donald J. Morriss, U. S. Forest Service, Washington, D. C.
4. "Some Examples of Industrial Forest Management Planning in the Southeastern United States." Donald D. Stevenson, The Buckeye Cellulose Corporation, Foley, Fla.

Tuesday afternoon, October 10

Richard L. Knox, Chairman (SAF)

1. "Recent Trends in Forest Photogrammetry." T. E. Avery, Department of Forestry, Michigan State University, East Lansing, Mich.
2. "Aerial Survey Techniques for the Spruce Budworm in the Lake States." Robert C. Heller, U. S. Forest Service, Washington, D. C., and Donald C. Schmiege, Lake States Forest Experiment Station, St. Paul, Minn.
3. "A Proposed Sampling Design for Extensive Forest Inventory: Double Sampling for Regression with Multiple Random Starts." Cherng Jiann Shiue (deceased) and Hugo H. John, School of Forestry, University of Minnesota, St. Paul, Minn.
4. "Swamp Drainage in European Forest Management." Joseph H. Stoeckeler, Lake States Forest Experiment Station, St. Paul, Minn.
5. Election of officers for SAF Division of Forest Management.
6. Report of standing committees.

Technical Session on Forest Recreation
Tuesday morning, October 10

Henry A. Harrison, Chairman (SAF)
A. B. Wheatley, Chairman (CIF)

1. "Recreation and Land Ownership." Kenneth B. Pomeroy, The American Forestry Association, Washington, D. C.
2. Panel Discussion: Forest Recreation Moves Ahead.

"State Public Lands." H. G. Wilm, New York Conservation Department, Albany, N. Y.

"Industrial Forest Lands." A. V. Smyth, Weyerhaeuser Company, North Bend, Ore.

"National Forests." Philip L. Heaton, U. S. Forest Service, Portland, Ore.

"National Parks." William L. Bowen, National Park Service, Washington, D. C.

"Forest Recreation Moves Ahead in Ontario." A. B. Wheattley, Ontario Department of Lands and Forests, Toronto, Ont.

3. Business meeting of SAF Division of Forest Recreation.

Technical Session on Forest-Wildlife Management
Tuesday morning, October 10

James P. Gilligan, Chairman (SAF)
A. T. Cringan, Chairman (CIF)

Program not received.

Technical Session on Education
Tuesday afternoon, October 10

K. G. Fensom, Chairman (CIF)
John Carow, Chairman (SAF)

Topic: Some Canadian and American Points of View on Current Problems of Forestry Education.

1. "Canadian Experience with the Five-Year Undergraduate Forestry

Schedule of Events

Sunday, October 8

SAF Council meeting: morning.
CIF Board meeting: afternoon and evening.
SAF Section delegates and Council closed meeting: afternoon.
Xi Sigma Pi meeting: afternoon.
JOURNAL OF FORESTRY editorial board conference: evening.
Association of Consulting Foresters open meeting: evening.
Extension Foresters meeting: evening.

Monday, October 9

General session: morning.
CIF business meeting: afternoon.
SAF Society Affairs session: afternoon.
Motion pictures: evening.
Alumni functions: evening.

Tuesday, October 10

Forest Management technical session: morning and afternoon.
Forest Recreation technical session: morning.
Forest-Wildlife Management technical session: morning.
Forestry Education technical session: afternoon.
Watershed Management technical session: afternoon.
Buffet dinner and social evening.

Wednesday, October 11

Silviculture technical session: morning and afternoon.
Forest Products technical session: morning.
Forest Economics and Policy technical session: morning.
Forest Fire technical session: morning and afternoon.
Range Management technical session: afternoon.
SAF Council meeting: afternoon.
Reception and social hour: evening.
Joint CIF-SAF annual dinner: evening.

Curriculum." John W. Ker, Faculty of Forestry, University of New Brunswick, Fredericton, N. B.

2. "The Feasibility and Needs for a Five-Year Professional Degree Program in the United States." Ernest Wohletz, College of Forestry, University of Idaho, Moscow, Idaho.

Discussion.

3. "Forest Technicians in Canada." George S. Allen, Faculty of Forestry, University of British Columbia, Vancouver, B. C.

4. "The Place of Technician Training in the United States." Archie E. Patterson, School of Forestry, University of Georgia, Athens, Ga.

Discussion.

Topic: Centennial of the Land Grant Colleges in the United States.

5. "Forestry Education in the Land Grant Colleges of the United States." Terrill B. Stevens, Department of Forestry, Michigan State University, East Lansing, Mich.

Discussion.

6. Business meeting of SAF Division of Education.

Technical Session on Watershed Management
Tuesday afternoon, October 10

Paul J. Zinke, Chairman (SAF)
A. S. L. Barnes, Chairman (CIF)

1. "Challenges and Opportunities in Watershed Management in the Lake States." Sidney Weitzman, Lake States Forest Experiment Station, St. Paul, Minn.

2. "Watershed Management by the Eastern Rockies Forest Conservation Board." George Tunstell, Eastern Rockies Forest Conservation Board, Edmonton, Alta.

3. "Watershed Management in Ontario through Conservation Authorities." A. S. L. Barnes and D. N. McMullen, Ontario Department of Commerce and Development, Toronto, Ont.

4. "Forest-Snow Relationships." Bertram C. Goodell, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

5. "Managing the Forest for Soil Moisture Control." Robert Zahner, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

6. Business meeting of SAF Division of Watershed Management.

Technical Session on Silviculture
Wednesday morning and afternoon, October 11

Paul O. Rudolf, Chairman (SAF)
David A. S. Dyer, Chairman (CIF)

1. "Site Conditions and Vegetation Patterns as Indicators of Prescribed Burning in Northern Coniferous Forests of Finland and America." Clifford E. Ahlgren, Quetico-Superior Wilderness Research Center, Ely, Minn.

2. "Use of Prescribed Fire in the Regeneration of Jack Pine." William R. Beaufait, Ford Forestry Center, Michigan College of Mining and Technology, L'Anse, Mich.

3. "Trial of a Photographic Technique to Count Cones." Donald T. Gordon, Pacific Southwest Forest and Range Experiment Station, Susanville, Calif.

4. "A Comparison of Growth of Four Northern Conifers under Long and Natural Photoperiod in Wisconsin and Florida." Richard F. Watt, Lake States Forest Experiment Station, St. Paul, Minn.

5. "Planting Hardwoods in the Southeastern Coastal Plain." Thomas Lotti, Southeastern Forest Experiment Station, Charleston, S. C.

6. Report of the Committee on Natural Areas. John F. Shanklin, Office of Assistant Secretary, U. S. Department of the Interior, Washington, D. C.

7. Report of the Committee on Forest Tree Improvement. Howard Kriebel, Ohio Agricultural Experiment Station, Wooster, Ohio.

8. Election of officers for SAF Division of Silviculture.

Note: Papers by Canadian participants in this technical session will be listed in the September issue.

Technical Session on Forest Fire
Wednesday morning, October 11

J. C. Macleod, Chairman (CIF)

1. "Goals and Organization of SAF Division of Forest Fire." J. S. Barrows, Intermountain Forest and Range Experiment Station, Division of Forest Fire Research, Missoula, Mont.

2. "A Critical Look at Forest Fire Prevention." Clare W. Hendee, U. S. Forest Service, Washington, D. C.

3. "An Industrial View of Forest Fire Control." W. B. Gayle, MacMillan, Bloedel and Powell River Company, Ltd., Vancouver, B. C.

4. "How Much Company Fire Protection on Company Lands?" O. G. Traczewitz, Woodlands Department, International Paper Company, Mobile, Ala.

5. "Some Applications of Radio in Forest Fire Control." R. Hook, Saskatchewan Department of Natural Resources, Prince Albert, Sask.

Wednesday afternoon, October 11
Carl C. Wilson, Chairman (SAF)

1. "Crown Fire Problems in the Lake States." John A. Beale, Wisconsin Conservation Department, Madison, Wis., and John H. Dieterich, Lake States Forest Experiment Station, St. Paul, Minn.

2. "Aircraft in Fire Control in Ontario." W. T. Foster, Ontario Department of Lands and Forests, Toronto, Ont.

3. "Applications of Fire Weather Service in Forest Fire Control." Dwight L. Phipps, Oregon State Board of Forestry, Salem, Ore.

4. "Crisis Periods and Fire Control Planning." Keith Arnold, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

5. Business meeting of SAF Division of Forest Fire and election of officers.

Technical Session on Forest Products
Wednesday morning, October 11

Harvey D. Erickson, Chairman (SAF)
E. S. Fellows, Chairman (CIF)

1. "The Role of Analytical Studies in Improving Harvesting Operations and Forestry Practices." Thomas A. Walbridge, Jr., Hiwassee Land Company, Athens, Tenn.

2. Motion picture on timber harvesting methods in Canada.

3. "Influence of Integration, Mergers, and Merchandising on Utilization of the Forest Crop." Bernard L. Orell, Weyerhaeuser Company, Tacoma, Wash.

4. Discussion.

5. Business meeting of SAF Division of Forest Products.

Note: Papers by Canadian participants in this technical session will be listed in the September issue.

Technical Session on Forest Economics and Policy
Wednesday morning, October 11

Ronald I. Beazley, Chairman (SAF)
David A. Wilson, Chairman (CIF)

Topic: Forestry Related to Trade and Investment in Forest Products between the United States and Canada.

1. "The Development of Trade and Investment in Forest Products between the United States and Canada." W. S. Bromley, American Pulpwood Association, New York, N. Y.

2. "Foreign Trade in Forest Products from the Point of View of an Importing Country (the United States)." I. Irving Holland, Department of Forestry, University of Illinois, Urbana, Ill.

3. "Foreign Trade in Forest Products from the Point of View of an Exporting Country (Canada)." A. L. Best and H. M. Babcock, Canadian Department of Forestry, Ottawa, Ont.

4. "The Future of Trade and Investment in Forest Products between the United States and Canada." David

V. Love, Faculty of Forestry, University of Toronto, Ont.

Discussion.

5. Business meeting of SAF Division of Forest Economics and Policy.

Election of officers.

Other business.

Technical Session on Range Management

Wednesday afternoon, October 11

Charles Terwilliger, Jr., Chairman (SAF)

W. R. Hanson, Chairman (CIF)

Program not received.

The CIF-SAF Dinner

Wednesday evening, October 11

Preceding the dinner there will be a reception and social hour.

Presentation of awards for achievement in biological research, SAF President Charles A. Connaughton; For merit, George A. Garratt, member of the SAF Council.

Address. John H. Hinman, International Paper Company, New York, N. Y.

Music and dancing.

Hotel Reservations

Those planning to attend the meeting are advised to arrive in Minneapolis on Sunday, October 8. The first general session will start at 9:30 a.m. on Monday, in the Leamington Hotel. All scheduled sessions will be held in this hotel.

There will be no central housing bureau for this meeting. Members should make their own room reservations direct with the hotels of their choice. In case the Leamington cannot accommodate all who request rooms, the overflow will be taken care of at the Curtis Hotel, directly across the street.

To enable the hotels to confirm requests, reservations should be received by them not later than September 15. Early reservations are advisable.

In all cases, reservation requests should state that they are for this particular meeting.

Additional cooperating hotels are listed below with their rates prevailing at the time this issue went to press.

The map of downtown Minneapolis, printed in this issue, will indicate the locations of cooperating hotels, and their distances from the Leamington. All listed below are within walking distance, or at most a short taxi ride, of the Leamington.

Persons wishing additional information about hotels and motels, and their rates, may obtain it from the Convention Department, Minneapolis Chamber of Commerce, 701 Second Avenue South, Minneapolis 2, Minn.

Hotels and Rates

All rates quoted are for rooms with baths. If the rate category requested is not available, rooms in the next highest category will be assigned.

Leamington Hotel (700 rooms), 10th Street at 3rd Avenue South, Minneapolis 4. Single occupancy, $8.50-$16.50. Double-bed rooms, $12.50-$18.50. Twin-bed rooms, $13.50-$21.

Curtis Hotel (800 rooms), 10th Street at 4th Avenue South, and Curtis Motor Lodge, 10th Street at 3rd Avenue South, Minneapolis 4. Single, $6.50-$10. Double, $8.50-$12. Twin, $11-$16.

Francis Drake Hotel (200 rooms), 10th Street and 5th Avenue South, Minneapolis 4. Single, $7-$11. Double, $9-$12.50. Twin, $11-$15.

Hampshire Arms Hotel (186 rooms), 900 - 4th Avenue South, Minneapolis. Single, $5-$6.50. Double, $7.50-$8.50. Twin, $8.50-$10.50.

Mark Twain Hotel (200 rooms), 1030 - 2nd Avenue South, Minneapolis 2. Single, $6.50-$8.50. Double, $8.50-$10.50. Twin, $9.50-$12.50.

Normandy Hotel (100 rooms), 8th Street at 4th Avenue South, Minneapolis 2. Single, $7-$10. Double, $11.50-$13. Twin, $15.-$16.

Pick-Nicollet Hotel (600 rooms), Nicollet and Washington Streets, Minneapolis 1. Single, $9-$13.50. Double, $11.50-$16. Twin, $12.50-$17.50.

Radisson Hotel (500 rooms), 45 South 7th Street, Minneapolis. Single, $8.50-$13. Double, $12-$16.50. Twin, $15-$20.

Sheridan Hotel (430 rooms), Marquette at 11th Street, Minneapolis 3. Single, $6-$6.50. Double, $8-$9.50. Twin, $11-$12.

Seventh Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 2, 1961. A president, vice president, and nine other members of the Council will be elected for the two-year term 1962-1963.

The present Council is listed in the box on page 607. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for more than two decades.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president. Thus all candidates for president are considered as nominated also for vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 16, 1961.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1962-1963.

The form of acceptance of a nomination may read as follows:

I accept the nomination to the office of President (or to membership on the Council) of the Society of American Foresters for the two-year term 1962-1963, and agree to serve if elected.

No nomination will be considered valid unless supported by the nominee's acceptance in writing which should be attached to the nominating petition.

All nominating petitions should be sent promptly to the Society office, 425 Mills Building, 17th Street at Pennsylvania Avenue, N. W., Washington 6, D. C. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Connaughton.

This committee is charged with the following duties:

1. To set the date of the election. (December 2, 1961, is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations. For their information the distribution of Council members by states during the period 1946-1961 is shown in Table 1, page 143, February issue.

Nominations Received

On the date of going to press the following nominations had been received:

For President

B. E. Allen, Savannah, Ga. (Council Member 1956-1957, 1958-1959, 1960-1961.)

Paul M. Dunn, New York, N. Y. (Council Member 1946-1947, 1948-1949.)

J. Herbert Stone, Portland, Ore. (Council Member 1954-1955, 1956-1957, 1958-1959.)

For the Council

William C. Bramble, Lafayette, Ind. (Council Member 1960-1961.)

Milton M. Bryan, Washington, D. C.

Gene L. Butcher, Frankfort, Ky.

Donald E. Clark, Denver, Colo. (Council Member 1958-1959, 1960-1961.)

Robert H. Clark, Fordyce, Ark.

George W. Dean, Charlottesville, Va.

F. T. Frederickson, International Falls, Minn.

W. D. Hagenstein, Portland, Ore. (Council Member 1958-1959, 1960-1961.)

Svend O. Heiberg, Syracuse, N. Y. (Council Member 1960-1961.)

George M. Jemison, Washington, D. C.

Dahl J. Kirkpatrick, Albuquerque, N. Mex.

Carl G. Krueger, Coeur d'Alene, Idaho.

Charles H. Lewis, Jr., Alexandria, La.

Walter H. Lund, Portland, Ore.

William A. Parr, Bel Air, Md.

Archie E. Patterson, Athens, Ga.

Burnett H. Payne, Washington, D. C.

Richard J. Preston, Jr., Raleigh, N.C. (Council Member 1960-1961.)

Kenneth J. Seigworth, Norris, Tenn.

John F. Shanklin, Washington, D C.

Stephen H. Spurr, Ann Arbor, Mich.

Russell C. Stadelman, Memphis, Tenn.

Eugene V. Zumwalt, Washington, D. C.

SETH G. HOBART, *Chairman*
Nominating Committee

Seventh Call for Fellow Nominations

All members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 2, 1961.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society. They shall be elected from the Members."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters hereby nominate John Doe for election to the grade of Fellow in 1961.

Remember these simple rules:

1. A petition may not name more than one nominee.

2. It must be signed by not less than 25 Members or Fellows in good standing.

3. It must be accompanied by a factual, not eulogistic, biographical sketch of at least 300 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society, 425 Mills Building, 17th Street at Pennsylvania Avenue, N.W., Washington 6, D. C., not later than September 16, 1961.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing). Only those nominees' names will appear on the ballot whose petitions are complete and valid in all details as of September 16, the closing date.

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows, the Council, the chairmen of the 22 Sections, and the chairmen of the 10 subject Divisions.

The system is described in Article IV, Section 4 of the Constitution. To win election a nominee must receive an affirmative vote of not less than one-half the total number of votes cast, as provided in Bylaw 11.

For the 1961 election there will be 135 electors, of whom 94 are Fellows. An elector has one vote only. Thus, a Fellow who is also a Council member has but one vote.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding service to forestry and to the Society. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 125 Fellows elected. At the present time the number of living Fellows is 94.

The current roster of Fellows appeared in the May issue, page 386.

Nominations Received

On the date of going to press the following nominations for Fellow had been received:

Frank A. Albert, Jacksonville, Fla.

Robert S. Campbell, New Orleans, La.

Nathan D. Canterbury, Houston, Texas.

Donald E. Clark, Denver, Colo.

Kenneth P. Davis, Ann Arbor, Mich.

Reginald D. Forbes, Ambler, Pa.

S. A. Graham, Ann Arbor, Mich.

Lewis R. Grosenbaugh, Berkelely, Calif.

J. V. Hofmann, Raleigh, N. C.

Walter H. Horning, Washington, D. C.

Wallace I. Hutchinson, Sherman Oaks, Calif.

George M. Jemison, Washington, D. C.

Henry R. Koen, Russellville, Ark.

Fred H. Lang, Little Rock, Ark.

E. W. Littlefield, Delmar, N. Y.

Henry J. Malsberger, Atlanta, Ga.

Ira J. Mason, Bethesda, Md.

Walter F. McCulloch, Corvallis, Ore.

William M. Oettmeier, Fargo, Ga.

Carl I. Peterson, Nashville, Tenn.

George R. Phillips, Chevy Chase, Md.

John A. Putnam, Leland, Miss.

A. B. Recknagel, Ithaca, N. Y.

John F. Shanklin, Washington, D. C.

Donald D. Stevenson, Foley, Fla.

Ray F. Taylor, Juneau, Alaska.

Charles L. Tebee, Missoula, Mont.

Allen E. Thompson, Seattle, Wash.

George O. White, Jefferson City, Mo.

Ernest Wohletz, Moscow, Idaho.

Council's Column

How Much Wood Will Actually Be Needed in the Future?

How much wood will be needed in the United States in the year 2000? Are the forest lands of the nation capable of producing this amount? Are the individual, corporate, and public owners of this land applying the kind of forest practices which will permit the land to meet this national goal? Are we growing too many trees? Will there be a timber shortage? How extensively will forest lands be used for purposes other than the production of wood products?

The forester is called upon almost daily to answer these questions and others of similar nature. They are very pertinent questions which require thoughtful and logical consideration when answered. These questions are also raised and discussed by segments of the public other than foresters. Therefore, the oral and written reply of the forester becomes a body of information which is extensively used not only by the forester, but other publics as well, in formulating a program of forestry for the nation.

The fact that the information is so used places a somber responsibility on the profession for an accurate analysis and proper interpretation of all related factors. This service, I believe, is performed according to the highest standards of professional ethics based on known facts.

However, there appears to be a weak link in this chain of developing a national forestry program and that is the method used in projecting future wood requirements. At least, after reading several articles debating this specific subject and after reviewing several reports containing conflicting

projections, I am confused. Perhaps other foresters are also confused, and what about the other segments of our population who are sufficiently interested in the subject to read and analyze these documents?

Several of the documents referred to predict the following national pulpwood requirements by the year 2000: Forest Products Division of the Business and Defense Services Administration, Department of Commerce—171 million cords; *Timber Resources for America's Future*, USFS, Departpartment of Agriculture—149 million cords; and Resources for The Future, Inc.—264 million cords.

It is not my purpose to question the validity of any of these individual projections but rather to raise the issue of the great variance in the estimates. Why should such a difference exist and how do we explain it to ourselves as foresters and to the public?

How do we judge which one, if in fact any, is closest to actual realization of wood requirements in the year 2000? It is quite apparent that we should have a common acceptable estimate of future demands when we are considering the capability of our forests to produce this supply of forest products.

This article does not question an increase in wood requirements or the need for increased production to meet future demand. It does question exactly how much increase will be required.

This decision determines the present and future types of programs recommended and applied to all forest lands in the nation in order that they will meet the anticipated requirements.

Assuming this to be a fairly accurate statement of the confusion existing regarding the amount of future wood requirements, it suggests that the Society of American Foresters can provide a valuable service. It should be possible for the Society to initiate a project which would result in formulating standard procedure to obtain a universally acceptable prediction of future wood requirements.

This would end the confusion concerning future needs and orient all interested persons to properly evaluate all proposals designed to attain the common objective.

H. J. MALSBERGER

Comments on SAF Publications

Mr. Charles Connaughton, President
Society of American Foresters

During the last few months several people have called my attention to the suggestion that the Society of American Foresters add to its existing publications program a new-type periodical. I gather that the suggestion is arousing sufficient interest and support so that it may receive serious consideration. The purpose of this letter is to point out what seem to me to be important reasons why the Society should not undertake a publication primarily designed as a "news" vehicle.

1. There are a number of publications already in the field which well serve the need to keep foresters informed of forestry news on a national and broad regional basis. *American Forests* is an excellent example. *The Timberman* and other trade-type journals contribute excellent regional coverage. Even with the limited news material provided in the back of the JOURNAL at present, there is tremendous overlap with the other publications which already serve the news field. It seems to me a Society news publication would be very largely a duplication of present well conducted efforts of other groups.

2. Even a "self-supporting" publication would divert the energy and thought of the Society's limited staff with an additional line of effort which could not help but detract from their effectiveness in established areas of Society activity. As the area of news coverage is already cared for by others and is of much less significance to *professional* development than other areas, I think such diversion of the staff would weaken rather than strengthen the professional impact of the Society.

3. A number of Sections already use news of sectional interest as the basis for an important Section activity. This is an area where news coverage is much less complete than at the national level. Introduction of a national news publication by the Society would cut the ground from under these Section newsletters because, to justify itself, the national organ would have to cover news of sectional interest. Thus, it would undermine important and worthwhile Section activity without any commensurate gain at the national level.

4. A news publication would inevitably draw attention away from the JOURNAL OF FORESTRY. To me the JOURNAL is the most powerful single instrument that the Society has to build the professional concept within our group and to provide the foundations for broader influence outside the profession which you have emphasized. Accordingly, anything which would reduce the attention which members give to the JOURNAL would take us a step backward. Publication of a news-type periodical would tend to distract from the JOURNAL the attention of those segments of the membership for whom the professional orientation provided by the JOURNAL is most essential.

HENRY J. VAUX
School of Forestry,
University of California,
Berkeley

May 19, 1961

SHOWN before a Section exhibit at the May 19-20 meeting of the Northern Rocky Mountain Section are: (*L* to *R*) David Tackle, vice chairman, Eastern Montana Chapter; Charles A. Connaughton, SAF president; and Richard T. Marks, vice chairman, Northern Rocky Mountain Section.

Coming Events

Allegheny Section

Allegheny Section will hold its summer meeting August 24-26 at Gettysburg, Pa.

Alaska Section

The Alaska Section will hold its meeting August 28-September 1, to coincide with the Twelfth Alaska Science Conference in Fairbanks (College).

Soil Conservation Society of America

The 16th annual meeting of the Soil Conservation Society of America will be held July 30-August 2 at Purdue University, Lafayette, Ind.

86th Annual AFA Meeting

The American Forestry Association will hold its 86th annual meeting in Santa Fe, N. Mex. October 1-4. Headquarters will be the La Fonda Hotel. Theme of the meeting is "The Stewardship of Our Public Lands." Followng a morning session on October 2, two and a half days will be devoted to field trips covering federal and state lands in the area. An annual banquet will conclude the meeting on October 4.

South Carolina and Florida Pass Registration Acts

During the recent annual sessions of the South Carolina and Florida legislatures there were enacted laws providing for the registration of foresters.

As word of this development was received shortly before this issue of the JOURNAL went to press, it seemed ill-advised to present a hastily drawn description of the provisions of the acts. The JOURNAL has requested Prof. Archie E. Patterson, chairman of the SAF Committee on State Registration and Licensing, to prepare a report upon the salient features for the information of SAF members.

South Carolina and Florida become the fourth and fifth states to adopt the legal framework for the registration and licensing of foresters. The others are Georgia (1951), Michigan (1955), and Alabama (1957).

Boyce, Yuill, New Associate Editors

Robert L. Furniss, associate editor for the JOURNAL in the fields of entomology and pathology, has found it necessary to resign his post due to an extended absence from the country on a European visit.

President Charles A. Connaughton has appointed two individuals to the editorial board following Mr. Furniss' resignation, one for entomology, one for pathology.

New associate editor for *Forest Entomology* is J. S. Yuill. Mr. Yuill comes originally from the West. He received his B.S. degree in agriculture from the University of Arizona and an M.A. in entomology from the University of California. For the past 26 years he has been with the Division of Forest Insect Research, formerly part of the old Bureau of Entomology, U. S. Department of Agriculture, and since 1954 part of the Forest Service. Until 1942 he was stationed in California where be conducted studies of various forest insect problems of the region. Following wartime service as an entomologist in the Navy, he has been in charge of the Forest Insect Laboratory at the Agricultural Research Center, Beltsville, Md.

Dr. John S. Boyce, Jr., recently of the Southeastern Forest Experiment Station, but now of the faculty of the University of Georgia, has been named associate editor for *Forest Pathology*. Boyce received a B.S. in plant science from Yale University and an M.F. from the same institution. He completed his doctorate work at Duke University.

Mr. Furniss took over his editorial assignment in June 1959. The JOURNAL and the SAF are indebted to him for two years of conscientious and highly capable service on the editorial board.

Croatan Chapter Holds Its First Meeting

The first meeting of the newly chartered Croatan Chapter of the Appalachian Section was held May 13, 1961, in New Bern, N. C. Thirty foresters attended the meeting.

Guests appearing on the program were Ralph C. Winkworth, chairman of the Appalachian Section; Fred H. Claridge, state forester of North Carolina; Mayor Robert L. Stallings, Jr. of New Bern; and Reverend William H. Jennings.

The main address was given by Fred Claridge who challenged the Chapter to take an active part in helping to solve the many forestry problems that arise on the local, state, and national levels by discussing them and letting its views be known. Ralph Winkworth spoke to the group on the advantages of Society membership and encouraged foresters living within the Chapter area to affiliate with the Chapter.

The Croatan Chapter is headquartered in New Bern, N. C., and encompasses 14 counties in eastern North Carolina. Chapter officers are: D. R. Varner, president, North Carolina Forest Service; R. A. Morin, vice president, Cape Fear Wood Corp.; P. A. Brown, Jr., secretary-treasurer, West Virginia Pulp and Paper Co.; and R. E. Haynes, program chairman, West Virginia Pulp and Paper Co.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of June are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of August 31, 1961.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Alaska Section

Elliott, W. O., Forester, Bur. of Land Mgmt., Anchorage, Alaska. Univ. of Minn., BSF, 1950.

Allegheny Section

Student Grade

PENNSYLVANIA STATE UNIVERSITY

Sucha, J. J.

WEST VIRGINIA UNIVERSITY

Antill, P. D. McLaughlin, T. G.

Junior Grade

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY

Bull, J. R.
Cunningham, H.
Dinus, R. J.
Downing, D. A.
Ettinger, G. E.
Even, D. R.
Frayer, W. E.
Gorby, D. W.
Groff, C. H., Jr.
Gum, P. W.
Hawk, R. E.
Heisler, G. M.
Hickok, K. H.
Kocur, M. F.
Lonberger, T. E.
Martin, R. W.
McIntire, C. O.
Mihalic, G. F.
Reeder, T. N., Jr.
Schweitzer, D. L.
Solomon, D. S.
Sucha, J. J.
Waltz, M. J.
Warner, S. F.
Wilson, D. E.
Wintersteen, R. J.

Cherng Jiann Shiue (1921-1961)

Cherng Jiann Shiue, 39, a member of the faculty of the University of Minnesota School of Forestry, died June 7.

Born November 1, 1921, in China, he obtained a Bachelor degree in forest management at Fukien College of Agriculture, and the Master degree and Doctorate in forestry at the University of Minnesota.

Before coming to the United States, Dr. Shiue served for eight years as research forester on the staff of the Taiwan Forest Research Institute. At the University of Minnesota he taught statistical methods and microtechnique, and conducted research in forest inventory.

He was a contributor to *Forest Science*, JOURNAL OF FORESTRY, and other professional and scientific periodicals.

Tom Wallace (1874-1961)

Tom Wallace of Louisville, Ky., editor emeritus of the *Louisville Times* and an Honorary Member of the Society of American Foresters, died recently.

Active in conservation affairs throughout his distinguished newspaper career, Mr. Wallace was a former member of the advisory board of the National Park Service, president of the Southern Forestry Congress in 1927, vice president of the American Planning and Civic Association, and chairman of the National Conference on State Parks. He received the Department of the Interior's conservation service award in 1953.

In recognition of his writings and work in the conservation of forests and other natural resources, the SAF Council elected him an Honorary Member in 1947.

Member Grade

Hilse, Alfred D., Collins Pine Co., Warren, Pa. Yale Univ., MF, 1955.

Associate Grade

Losche, C. K., Soil Scientist, USFS, Elkins, W. Va.

Appalachian Section

Student Grade

NORTH CAROLINA STATE UNIVERSITY

Reid, J. E.

Junior Grade

Smith, R. L., Forest Eng., Washington, N. C. (Reinstatement).

Students Eligible for Automatic Advancement

DUKE UNIVERSITY

Clayton, J. E.
Collins, D. J.
Czerepinski, F. P.
Drayton, E. R.
Fish, R. B.
Hudspeth, H. S.
McQuilkin, R. A.
Pruess, J. F.
Quarles, D. L.
Towers, B.
Weaver, R. S.

NORTH CAROLINA STATE COLLEGE

Baker, J. O., Jr.
Boyette, A. C.
Bradley, E. W.
Bray, W. T.
Briggs, C. S.
Brill, R. B.
Buckley, W. B.
Byrd, W. B., Jr.
Cuningham, H. C., Jr.
Dabney, W. R.
Eckstein, L. W.
Freeman, H. B.
Harrill, T. L.
Keaton, P. N.
Kendall, W. A.
Langston, B. H.
Lawrence, L. K.
Lockwood, J. N.
Mace, S. V.
McPherson, J. P.
Moore, A. R.
Scheld, H. W., Jr.
Scheurenbrand, H. J., Jr.
Shuford, W. B.

Grimsley, D. L.
Gurganus, C. M.
Hamme, J. C.
Hamrick, B. W.
Snider, L. B.
Tyson, G. S.
Walters, J., Jr.
Watson, C. W.
Wolfe, J. D.

Central Rocky Mountain Section

Junior Grade

Woodfin, R. O., Jr., Grad. Student, Univ. of Wash., Colo. State Univ., BSF, 1955.

Students Eligible for Automatic Advancement

COLORADO STATE UNIVERSITY

Beckman, R. E.
Braddock, A. A., Jr.
Dupree, G. G.
Ehrlich, A. C.
Hoffman, V. C.
Pulford, W. J.
Starkey, J. R.
Swartz, R. E.
Walters, M. D.

Central States Section

Student Grade

PURDUE UNIVERSITY

Bennett, E. G.
Hamilton, J. S.

Junior Grade

Students Eligible for Automatic Advancement

PURDUE UNIVERSITY

Ballantyne, R. K.
Baranyay, W. G., Jr.
Bunger, T. P.
Copes, D. L.
Freund, F. W.
Karp, J.
Martin, C. A.
Naugle, D. L.
Van Emon, P. J.
Weimer, C. R.
Worthington, H. K.

Columbia River Section

Student Grade

OREGON STATE UNIVERSITY

Brandt, B. L.
Hedgpeth, G. C.

Brassfield, R. S.
Cron, R. M.
Dodd, A. R.
Harris, B. K.
Osborn, D. W.
Stenkamp, P. R.
Thayer, H. A.
Wickham, P. B.

Junior Grade

Bastin, R. W., Forester, Bur. of Land Mgmt., Coos Bay, Ore. Purdue Univ., BSF, 1959.

Fridley, V. A., Jr., Forester, USFS, Klamath Falls, Ore. Ore. State Univ., BSF, 1961.

Students Eligible for Automatic Advancement

OREGON STATE UNIVERSITY

Anderson, M. R.
Barstad, R. L.
Black, R. S.
Blanchard, G. W.
Christenson, D. G.
Cooley, A. R., Jr.
Crawford, R. W.
Dano, H. C.
Edwards, R. L.
Eveleth, N. J.
Ferguson, E. L.
Goodman, L. E.
Graf, J. F.
Hermann, J. P.
Klemme, C.
Lawler, T. A.
Mallery, M. D.
Mann, C. W.
Norris, L. A.
Olson, W. R.
Page, R. S.
Pender, J. H.
Spahr, M.
Stadelman, L. R.
Sykes, R., Jr.
Vroman, K. M.
Weaver, F. C.
Weaver, L. D.

Member Grade

Meier, E. R., Forester, Bur. of Land Mgmt., Washington, D. C. (Junior 1954).

Oliver, D. M., Timber Management Assistant, Gardiner, Ore. (Junior 1954).

Affiliate Grade

Bambe, K., Forester, Bur. of Land Mgmt., Coos Bay, Ore.

Gulf States Section

Junior Grade

Students Eligible for Automatic Advancement

LOUISIANA STATE UNIVERSITY

Aulds, C. B.
Cole, J. F.
DeSoto, V. V., Jr.
Earnest, W. C.
Forbes, D. C.
Fowler, J. E.
Gaskin, P. C.
Griffin, E. E.
Hurst, C. S.
Impson, J. W.
Jones, B. C.
Naff, N. F.
Penny, J. W.
Robinson, B. H.
Rogers, W. H., Jr.
Saxon, S. N.
Smiley, W. L.
Sullivan, A. C.
Wale, C. R.

LOUISIANA POLYTECHNIC INSTITUTE

Butler, I. H., Jr.
Chapman, J. P.
Garland, R. G.
Harris, T. R.
Hughes, C. D.
Lowery, H. A.
Lowery, W. D.
Smith, W. D.
Watts, T. H.
Woodard, J. M.
Young, W. P., Jr.

Member Grade

Siegel, W. C., Forest Economist, USFS, New Orleans, La. (Junior 1954).

Affiliate Grade

Launius, R. D., Forester, USFS, Meadville, Miss.

Inland Empire Section

Junior Grade

Robinson, L. E., Chief Forester, Diamond National Corp., Coeur d'Alene, Idaho. Univ. of Idaho, BSF, 1950.

Students Eligible for Automatic Advancement

UNIVERSITY OF IDAHO

Adams, D. L.
Middendorf, J. F.

Alberta, J. L.
Best, R. K.
Brock, C. E.
Brock, R. J.
Christy, D. A.
Comstock, D. E.
Dungan, J. L.
Ellison, L. N.
Emmingham, W. H.
Farmer, E. E.
Furniss, A. B.
McLaughlin, R. F.
Meisner, G. E.
Murphy, B. C.
Nelson, D. O.
Nielsen, E. P.
Ogle, R. A.
Pence, D. T.
Polz, E. A.
Reeb, M. C.
Ritchey, N. C.
Runberg, D. E.
Schultz, E. L.
Sharpnack, D. A.
Taubman, J. H.
Waldron, H. M., Jr.

Member Grade

Caddis, A. J., Forester, USFS, Grangeville, Idaho. Univ. of Mich., BSF, 1956.

Intermountain Section

Junior Grade

Frederickson, P. W., Asst. Sales Mgr., Boise Cascade Corp., Emmett, Idaho. (Reinstatement).

Students Eligible for Automatic Advancement

UTAH STATE UNIVERSITY

Anhold, M. L.
Avery, C. C.
Belanger, R. P.
Bills, S. W.
Burnette, J. A.
Freeman, D. W.
Kaufman, T. R.
Lee, L. A.
Lund, H. G.
Murdock, B.
Murdock, C. M.
Spalding, F. L., Jr.

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Hook, D. D.
Howard, D. M.
Taylor, K. F.
Weeks, L. M.
Wilhelm, C. S., Jr.

Member Grade

Bossi, J. E., District Ranger, Afton, Wyo. (Junior 1954).
Christensen, R. C., Forest Ranger, Spanish Fork, Utah. (Junior 1954).
Harrison, H. A., Asst. Dist. Ranger, Evanston Ranger Dist., Evanston, Wyo. Univ. of Mass., BSF, 1955 (Junior 1955).
Pierovich, J. M., Forest Ranger, USFS, Cascade, Idaho. (Junior 1954).
Rinehart, G. C., Forester, USFS, McCall, Idaho. (Junior 1954).
Tocher, S. E., Teaching Staff, Utah State Univ., Logan, Utah. (Junior 1954).
Van Winkle, H. H., Forest Supervisor, USFS, Jackson, Wyo. (Junior 1954).

Kentucky-Tennessee Section

Junior Grade

Curlin, J. W., Staff Forester, TVA, Norris, Tenn. Louisiana State Univ., BSF, 1959.

New England Section

Student Grade

UNIVERSITY OF MAINE

Galaba, J. J.
MacLauchlan, D. E.

UNIVERSITY OF MASSACHUSETTS

Porter, G. T.

UNIVERSITY OF NEW HAMPSHIRE

Morse, J. H.

Junior Grade

Vaillancourt, J. H., Manchester, N. H. Univ. of N. H., BSF, 1961.

Students Eligible for Automatic Advancement

UNIVERSITY OF MAINE

Almond, J. W.
Benoit, C. R.
Brown, M. F., Jr.
Cross, P. W.
Dawson, R. J.
Demo, M. W.
Fiske, P. R.
Galaba, J. J.
Goodenough, R. D.
Groff, R. W.
Hitchcock, R. C.
Hitchen, J. R.
Kennedy, R. A.
Lewis, D. W.
MacLauchlan, D. E.
Perry, R. F.
Platt, B. H.
Rooney, F. M.
Safford, L. O.
Solari, J. E.
Taber, D. W.
Thompson, R. O.
Vogellus, J. T.

UNIVERSITY OF MASSACHUSETTS

Creelman, A. N.
Davidson, W. H.
Forest, D. J.
Giebel, F. B.
Goldie, D. E.
Hubbard, D. E.
Lemoine, N. W.
Morin, D. N.
Pease, R. I.
Stevens, D. C.
Thompson, W. A.

UNIVERSITY OF NEW HAMPSHIRE

Kingsley, N. P.
Lacasse, N. L.
McHugh, W. J.
McKay, D. P.

YALE UNIVERSITY

Alcorn, W. W.
Huber, L. G.
Langham, C. M., Jr.
Larson, L. K.
Miller, L. N.
Rollins, J. A.
Thurston, E. A.

New York Section

Student Grade

Demeree, R. L.
Palmer, J. D.

Junior Grade

Students Eligible for Automatic Advancement

STATE UNIV. COLLEGE OF FORESTRY AT SYRACUSE UNIVERSITY

Carlen, J. G.
Eabry, H. S.
Ferguson, R. C.
Jurgensen, M. F.
Krichbaum, W.
Lampman, M. V.
Martin, J. A.
Predmore, A. M.
Pringle, G. A.
Reining, R. J.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA

Buchanan, J. B.
Fowler, G. W.
Kettlewell, R. J.
Lent, J. D.
Philpot, C. W.
Werner, K. R.

Junior Grade

Davis, D. C., Area Forester, Simpson Timber Co., Korbel, Calif. Ore. State Univ., BSF, 1958.

Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Beam, P. H.
Carville, P. P.
Cecchi, R. B.
Chester, G. S.
Gleason, A. P.
Harrell, R. D.
Heitkotter, B. W.
Lauderdale, K. R.
Leimbach, P. A.
Payne, B. R.
Rickson, D. E.
Sorenson, K. G.
Stikkers, D. E.
Willen, D. W.
Youngberg, A. D.

Northern Rocky Mountain Section

Junior Grade

Students Eligible for Automatic Advancement

MONTANA STATE UNIVERSITY

Abbott, R. W.
Appel, R. O.
Carr, W. R.
Elliott, J. W.
Fudge, C. W.
Greenwald, W. F.
Heiser, D. A.
Jacobson, J. A.
Jenni, D. R.
Lundeen, L. J.
McMichael, M. D.
Meek, K. A.
Morton, D. H.
Pittman, G. D.
Travers, C. M., Jr.

Ozark Section

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI

Coose, R. L.
Crozier, R. G.
Deutsch, H. A.
Lester, J. E.
Loewenberg, B. J.
Null, W. S.
Reid, C. P. P.
Williams, F. R.

Affiliate Grade

Dennington, R. W., P. O. Box 91, Lewisville, Ark.
Shields, C. R., Glenwood, Ark.

Associate Grade

Sullivan, W. M., Chip & Chemical Handler, Dierks Fiber Board Plant, DeQueen, Ark.

Puget Sound Section

Junior Grade

Post, A. J., Timber Assessment Analyst, Weyerhaeuser Co., Tacoma, Wash. (Reinstatement).

Students Eligible for Automatic Advancement

UNIVERSITY OF WASHINGTON

Alban, D. H.
Andrews, D. A.
Ball, D. G.
Ballard, T. M.
Beckman, K. M.
Binkley, V. W.
Breum, T. N.
Martinsen, M. W.
Mathis, J. L.
McCaslin, P. H.
Moorhead, W. W., Jr.
Nichols, F. R.
Ramm, A. S.

Callahan, B. T. — Rollins, C. T.
Carlson, R. A. — Ryan, R. J.
Christensen, C. S. — Sorenson, D. R.
Davis, D. L. — Stedman, J. A.
Deer, T. E., Jr. — Summerlin, R. E.
Ells, C. D. — Swanson, H. A.
Fagerness, G. A. — Taylor, R. N.
Furman, L. H. — Teagle, R. B.
Hedin, A. T. — Trowbridge, L. W.
Jacobson, B. G. — Vernon, J. R.
Kammenga, J. J. — Waali, D. R.
Kelly, R. A. — White, E. E.
Wilson, R. G.

Affiliate Grade

Duemling, W. F., Jr., Forester, USFS, Darrington, Wash.

Southeastern Section

Student Grade

UNIVERSITY OF GEORGIA

Bloodworth, S. I. — Duncan, A., Jr.
Brightwell, C. S. — Fair, C. L.

Junior Grade

Students Eligible for Automatic Advancement

AUBURN UNIVERSITY

Chancey, J. E. — James, E. I.
Clearman, F. W. — Nichols, K. C.
Doyle, L. M. — Schwartz, R. W.
Greer, J. E. — Tyson, J. P., Jr.
Harlan, J. P. — Wade, L. H.
Howell, W. C., Jr. — Wright, W. M.

UNIVERSITY OF FLORIDA

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Croxton, E. A. — Knudsen, W. R.
Estes, J. E. — Kromer, L. P.

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Hemingway, G. B. — McCroan, L.
Higginbotham, P. R. — Morse, T. A.
Wade, E. V.
Wetzel, A. G.

UNIVERSITY OF GEORGIA

Bailey, J. W. — Gross, O. S., Jr.
Bailey, T. L. — Hatcher, R. D.
Bennett, J. W., Jr. — Hewes, C. F.
Bird, J. D. — Hinson, C. E.
Blalock, T. M. — Hyatt, R. R.
Booth, A. K., Jr. — Jordan, H. M.
Bulloch, S. G. — Kitchens, R. N.
Campbell, D. C. — Matthews, R. M.
Campbell, G. C. — McDonald, A. R.
Cathey, J. E. — Moore, G. C., Jr.
Clements, L. J. — Morse, W. E.
Cooper, C. C. — Parker, C. P.
Crowley, C. A. — Perry, G. L.
Davis, J. T., Jr. — Renegar, G. L.
Dekle, J. G. — Roller, W. O.
Edwards, O. C. — Stone, J. S.
Fitzpatrick, D. — Tatum, W. J.
Fulmer, P. T. — Trammell, R. B.
Gilbert, C. L. — Veal, B. D.
Gowen, R. W., Jr. — Vines, J. V.
Woolsey, D. L.

Member Grade

Grisham, E. W., Forest Supv., St. Regis Paper Co., Lumpkin, Ga. (Junior 1953).

Upper Mississippi Valley Section

Student Grade

IOWA STATE UNIVERSITY

Gutcher, D. E.

UNIVERSITY OF MINNESOTA

Asch, R. L. — Austin, J. W.

Junior Grade

Students Eligible for Automatic Advancement

IOWA STATE UNIVERSITY

Barker, D. M. — Gordon, J. C.
Borchers, H. A. — Maeglin, R. R.
Brisbin, R. L. — Shepard, R. A.
Failor, G. A. — Walk, F. O.

UNIVERSITY OF MINNESOTA

Alm, A. A. — Hill, E. W.
Andrews, L. E. — Illi, W. A.
Brown, J. A. — Johnson, R. C.
Buttrey, T. — Kauth, W. W.
Churchill, G. B. — Lindquist, H. A.
Dieckhaus, J. W. — Oettel, R. A.
Ellefson, P. V. — Ostrom, A. J.
Engels, J. D. — Pederson, R. M.
Erickson, C. J. — Peterson, D. R.
Erickson, W. C. — Russell, K. W.
Flannelly, R. R. — Sall, D. C.
Hall, J. T. — Schloer, W. C., Jr.
Henson, L. D. — Steiro, R. L.
Turner, M. G.

Associate Grade

Ewan, H. G., Entomologist, Lake States Forest Expt. Sta., St. Paul, Minn.

Wisconsin-Michigan Section

Student Grade

MICHIGAN STATE UNIVERSITY

Abraham, R. G. — Bristol, R. G.

UNIVERSITY OF MICHIGAN

Shepherd, R. W. — Stienon, J. P.

Junior Grade

UNIVERSITY OF IDAHO

Seaberg, D. R., Jr., Forester, USFS, Laona, Wis. (Reinstatement).

Junior Grade

Students Eligible for Automatic Advancement

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY

Eilertsen, D. N. — Paddock, R. W.
Hannahs, L. W. — Partyka, E. J.
Holli, D. V. — Piepenbrink, H. H.
Kabat, L. R. — Preston, D. R.
Landgraff, D. A. — Reed, C. G.
Magnuson, K. C. — Schindler, R. A.
Matero, D. A. — Scott, R. E.
Mosher, E. C. — Walimaa, G. J., Jr.
Nelson, R. L. — Woerpel, L. S.
Nygren, H. T. — Ziemer, I. R.

MICHIGAN STATE UNIVERSITY

Adams, P. W. — Mortensen, C. O.
Case, J. R. — Rochester, P. G.
Forster, R. B. — Ross, M. T.
Hurja, T. J. — Taylor, H. W., Jr.
Matheson, W. E. — VanderKolk, M. P.
Morse, B. E. — Wickert, A. J.
Wilson, T. A.

UNIVERSITY OF MICHIGAN

Allen, J. E. — Hetzel, T. D.
Argow, K. A. — McVicar, C. A.
Barton, M. A. — Misiak, R. D.
Baughman, W. D. — Perison, L. C.
Brandes, R. O. — Reuter, A. F.
Crawford, N. A. — Schrader, C. R.
DeByle, N. V. — Warren, R. C.
Ernst, G. J. — Webb, W. M.
Zingg, J. G.

No Section

Corresponding Grade

Gonzalez, J. M., Forest Eng. Agroman, Empresa Constructora, S. A. Madrid, Spain. Oregon State Univ. BSF, 1961.

Kim, Y. P., Senior Forester, Ministry of Agr. & Forestry, Seoul, Korea. Seoul National Univ. BSF, 1955.

Thirgood, J. V., Instructor, State Univ. College of Forestry at Syracuse Univ., N. Y.

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National Outlook

End to Feuding? The Departments of Agriculture and Interior for years have had differences, mostly behind the scenes, over matters involving public lands. From time to time the feuding has become quite heated. President Kennedy, soon after he took office, indicated that he was aware of this, and recommended that the two departments endeavor to reconcile their long-standing differences. Accordingly, Interior's Secretary Udall and Secretary Freeman of Agriculture have had some discussions on public land uses and other points that have caused friction. Their hope is to get an agreement between the two departments which can be taken to the White House for approval. In a recent television interview, Secretary Udall said he thought "some kind of a solution emerging from our discussions" might be looked for. He indicated that if the two departments didn't solve their problem the President would probably solve it for them.

Parks and Forests. One of the main points of contention between Interior and Agriculture has been the transfer of lands from national forests to national parks. Over the years some 5 million acres have been transferred from national forests administered by Agriculture's Forest Service to national parks under Interior's jurisdiction. Only about one-tenth as many acres have passed in the other direction.

As might be expected, Agriculture has not always been happy about this. It has resented being accused of a "dog-in-the-manger" attitude when it opposed transfer of lands which it believed already were adequately managed for the protection and wise use of their public values. Actually, it cooperated in a number of the transfers from forest to park status. Since such transfers add nothing to the total of lands under public conservation management, some conservation groups think that Interior, rather than expand its operations by "raids" on another department, would do better to concentrate its efforts and funds on the development of existing park areas and on the acquisition of certain other areas of outstanding scenic or historic interest that are not now under government administration and are threatened with destruction or undesirable exploitation of their public values.

Meanwhile, pressure continues for new national parks involving national-forest lands. Legislation has been introduced to establish a Great Basin National Park in Nevada, an Oregon Dunes National Seashore, and an Ozark Rivers National Monument in Missouri. Several bills call for "study" of proposed park projects in national forests. A number of outdoor recreation organizations are clamoring for additional national park projects that so far have not been officially proposed. A new organization, Trustees for Conservation, is especially active in lobbying for park proposals. Current proposals, official and unofficial, in the aggregate would involve transferring some 10 to 15 million acres of national-forest lands, now under multiple-use management, to the Park Service.

New Department? Will the proposal for a new Department of Natural Resources come up again? Such a proposal has been brought forward a number of times before. It was advocated during the Hoover administration. Harold Ickes, President Franklin Roosevelt's Secretary of the Interior, tried hard to get his department recognized as the government's primary conservation department and to have the Department of Agriculture's Forest Service transferred to it. Agriculture opposed transfer of the Forest Service to another department because the Forest Service's activities are closely allied with other research, scientific, and cooperative work of the Agriculture Department.

During Interior Secretary Udall's television interview, mentioned above, he was asked if he would favor a separate Department of Natural Resources. The Secretary didn't close the door on the idea. He said he was not proposing it "at the present time." In his reply, he linked transferring the "Forestry Service" to Interior with "having a Department of Natural Resources,"—a possible indication that in his thinking his own department is a potential Department of Natural Resources.

Funds for Forestry. Appropriations for the U. S. Forest Service and for Interior's land-managing agencies for the fiscal year 1962 (which began July 1, 1961) were still pending in the Senate when this was written. But there was no doubt that the conservation agencies would be well treated. President Eisenhower's budget last January contained increases for many of the forestry and related items. President Kennedy asked for a large number of further increases. As passed by the House, the appropriation bill for Interior and related agencies had most of President Kennedy's requested increases trimmed a bit, but it still showed substantial boosts over the amounts appropriated for the preceding fiscal year. House-approved total of regular funds for the Forest Service, amounting to more than $194 million, was some $33.8 million greater than the 1961 appropriation. The Senate Appropriations Committee gave the forestry items sympathetic hearing. Some further increases in the Senate were expected, and there was some talk of a large amount of additional funds for forestry work in areas of unemployment.

The expected increases will enable the conservation agencies to take on more employees. The Forest Service will have funds for several hundred new jobs.

Wilderness Bill. Hearings on the bill to authorize a national wilderness system were held by the Senate Committee on Interior and Insular Affairs last February, but the bill (S. 174, authored by Senator Clinton P. Anderson of New Mexico) remained in committee, unreported, into the summer. Advocates of the bill were opposing two amendments submitted by Senator Frank Church of Idaho. One would make possible the exclusion of existing primitive areas in national forests from the proposed wilderness system ("primitive area" was the original Forest Service designation for wilderness). The other would open to mineral exploitation all areas in the new wilderness system, including national parks now closed to mining.

Secretaries of Agriculture and Interior both appeared

Editor's note.—It is noted with embarrassment that on the first appearance of "National Outlook" in the July issue the first sentence contains a typographical substitution that went undetected until too late. The administration referred to should have been the "Kennedy," not the "Kentucky."

at the hearings personally to urge enactment of the wilderness bill. Features in earlier bills which the departments found objectionable have been deleted. In his special message to Congress on natural resources, President Kennedy urged enactment of a wilderness protection bill. Eventual approval of the bill by the Senate was expected this year, but it seemed doubtful that it would get through the House.

Youth Conservation Corps. The Senate Subcommittee on Employment and Manpower in July approved a bill which would establish a Youth Conservation Corps patterned after the Civilian Conservation Corps of the 1930's, and authorize an experimental Youth Public Service Program. The bill (S. 404) was sent to the full Committee on Labor and Public Welfare for action.

As approved by the Subcommittee, the measure was a combination of a Youth Conservation Corps bill introduced by Senator Hubert H. Humphrey of Minnesota and the Youth Employment Opportunities Bill (S. 2036) recommended by President Kennedy in June. The latter bill was also introduced by Senator Humphrey.

Title I of the bill establishes the Youth Conservation Corps. It authorizes a strength of 30,000 during the current fiscal year, 50,000 and 100,000 in the two succeeding fiscal years, and 150,000 thereafter. Young men 16 to 21 years old, inclusive, would be eligible. Enrollments would be apportioned among the states according to a formula based 50 percent on population and 50 percent on unemployment and other factors. Members of the Corps would be paid $60 a month.

Two-thirds of the YCC would be employed in conservation work on federal lands, including the national parks and national forests. The other one-third would be employed on state and local conservation projects, which would be financed 50 percent by the states.

The camps would be operated by the state and federal conservation agencies responsible for the projects.

Revision of Fees. Conferences have been under way between representatives of Interior, Agriculture, and other agencies looking to establishment of more uniform fees for grazing, timber, and other uses on national forests and public lands. Changes in some of the fees and fee systems can be expected. The studies were prompted by the President's statement that he was requesting the Budget Director, in consultation with departments and agencies concerned, to formulate "general principles for the application of fees, permits, and other user charges at all types of Federal natural resource projects or areas."

Uniform Timber Practice. The Secretaries of Agriculture and Interior recently announced adoption of 13 recommendations of a joint study that is designed to bring into closer uniformity the timber sales practices of the Forest Service and the Bureau of Land Management. Although the new policies are primarily designed for forest lands administered by the two agencies in western Oregon, several recommendations are of wider geographic application.

Among recommendations are orders to standardize management plan inventory procedures, reconcile differences in determining allowable cut, and detailed field studies looking to possible uniform adoption of the International ¼-inch rule and/or cubic foot measurement as a substitute for the Scribner Decimal C rule.

Other recommendations include possible adoption of a joint nursery program, action to meet land jurisdictional problems in the checkerboard ownership areas of western Oregon, action to resolve legal differences now existing in the transfer of contracts, and maintenance of close liaison on set-aside timber sales for small business. Interagency committees in Washington, D. C., and Portland are to be strengthened and given specific responsibilities for further recommendations on uniform timber management practices.

Wildlife Disease and Management. Management of wildlife, with its many complex problems, may be further complicated by increasing attention to the large number of diseases in wild animals that are transmissible to domestic livestock and to human beings. A report recently published by the United Nations Food and Agriculture Organization urges more research in this field, and cooperation among nations in wild animal disease control.

Construction Gains. The annual rate of private housing starts was climbing up during the first few months of this year from the low rate of December 1960 indicating an increasing demand for forest products in the construction field.

Happy Birthday. The industry-sponsored American Tree Farm Program is 20 years old this year. American Forest Products Industries, Inc., is encouraging widespread observance of the anniversary. In its twentieth year the tree farm program lists more than 19,000 certified tree farmers, with some 54 million acres of timber land.

Ghost Ranch Exhibit. The Forest Service and the Soil Conservation Service, with Agriculture Department's Exhibits Service, are preparing permanent, living, on-the-ground exhibits at Ghost Ranch Museum, near Abiquiu, New Mexico, to be dedicated during The American Forestry Association's annual meeting in Santa Fe, October 1-4. Ghost Ranch Museum was built and is maintained by the Charles Lathrop Pack Forestry Foundation, on lands leased from the Board of Christian Education, United Presbyterian Church.

Price Cut. Increased acreages of federal lands at lower prices are now available to state and local governments for public parks. Interior Secretary Udall announced that state and local governments in the public land states may purchase lands from the national land reserve for $2.50 an acre, or lease them for 25 cents per acre a year. Previously required payments were as high as 50 percent of fair market value. At this rate only 1,954 acres were set aside for state or local parks last year.

The price reduction is aimed at what the Secretary termed the "wise practice" of sorting out federal lands and getting those suitable for state and local parks into local control. Under law, the lands must be dedicated permanently to public recreation or they will revert to the federal government.

For 1960 through 1962, the Department already had raised the yearly limit on land a state may obtain from 640 to 12,800 acres. Subsequently the increase will be to 6,400 acres. Local governments may obtain up to 640 acres a year.

Pesticides Coordination Committee. An informal federal coordinating committee on pesticides has been formed at the direction of the Secretaries of Agriculture and Interior. Reported objectives include a review of existing pesticides programs, and review of plans and probable effects before any new federal program is started. The committee later may be given formal status by executive order. Early this year, the President called attention to "one agency encouraging chemical pesticides that may harm the songbirds and game birds whose preservation is encouraged by another agency." Establishment of the present interagency committee was made known during a meeting of representatives of conservation organizations and federal agencies called by Congressman John D. Dingell of Michigan. He is author of a bill (H.R. 4668) which would require coordination among federal agencies and between them and state wildlife agencies on chemical pesticide programs.

Letters

Membership Lists

In 1960, approximately 18 to 20 pages of the JOURNAL were devoted to the section on "Membership Applications and Advancements." In my opinion, this is one feature that rates rather low in reader interest and usefulness. On the other hand, an annual or biennial SAF membership directory would certainly be welcomed by foresters who like to keep in touch.

It seems reasonable that the elimination of the Membership Applications section might save enough pages every 2 years or so to transform a regular issue of the JOURNAL into a membership directory. Even a special issue should be relatively inexpensive if compiled from the Society's addressograph plates and printed in reduced type of multilith or lithograph. Since our last directory (was it 1952?) I have moved 5 times—and somehow, I have a feeling that a few of my associates have done likewise.

Any possibilities?

GENE AVERY
East Lansing, Mich.

(*Space does not permit an adequate discussion of the considerations involved in these two suggestions but it might be mentioned that the last directory was issued in* 1956 *and totaled* 115 *pages.—Ed.*)

Forest Recreation

There is so much being written and said about forest recreation, I cannot refrain from saying something on this subject, because the things that happen in forest recreation will certainly greatly affect foresters and forestry within the next few years.

For the past 15 years—or is it 16 years?—I have spent my summers in the forest, and have seen the number of forest users increase from year to year. And I have made the not very elevating observation that the increase in the number of forest recreation seekers does not represent a return to nature, but is simply the result of the American pursuit of diversions. The causes for this increase go back to the economies of the vacation, and to the great amount of advertising and publicity given to outdoor recreation by the mass media.

The economic matter was well summed up by a camper who said to me: "I don't go for this camping stuff. But it's the only way we can afford to take a vacation away from home." And, as he pointed out, "If we could afford it, we would rent a nice cottage on a nice lake with lots of things to do, and live it up." And the mass media have turned considerable attention to outdoor recreation because increasingly the vacation is a thing on which the people who have outdoor goods and services to sell have set their sights. Unfortunately, these people are trying to sell some commodity or a service rather than help the individual find what he wants or might want.

In view of this, foresters must recognize that conditions might change and cause a switch to other recreational pursuits. If this should happen, and I am inclined to think it will, people will be drawn away from forest recreation, and the projected statistics and plans will become invalid.

C. I. MILLER
Lafayette, Ind.

88/100 of 1%

Dr. Garratt reported contributions of $2,200 to date for the $250,000 SAF Endowment Fund at the April Council meeting. (JF, June 1961, p. 465.)

Many months ago every member received a special letter from Dr. Garratt outlining the purpose of and need for the Fund and inviting the member to advance the profession of his livelihood by participating.

Score at time of report: 88/100 of 1% of goal achieved; average contribution per member, 13 1/3 cents.

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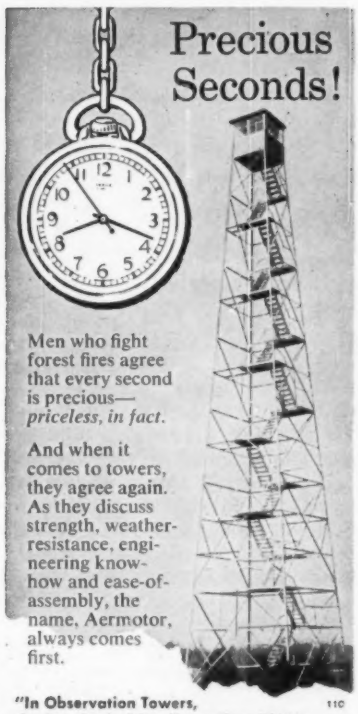
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Industry-State Partnership

History is replete with examples that prove the battle for democratic processes never ends, and here in the United States it appears that each man and each organization must participate in this battle from infancy if we are to maintain our liberties.

Professional foresters can well do their part in this battle in encouraging a working partnership between forest industry and the various state forestry departments and departments of natural resources. Benefits will inevitably result to both industry and the state organizations.

Essentially industry should be in a position to critically review department programs at all levels and to support department needs in the state legislatures. Our state boards of forestry, if properly constituted, are able to do this on the top level and industry associations should fill the gaps of needed critical review and support of programs and budgets on the intermediate and lower levels.

The departments can effectually reciprocate by putting training emphasis on service rather than unreasoning law enforcement; by making certain that all legislation and all regulations are circulated and discussed by industry before enactment; by operating with modern management techniques that return a maximum of service for every dollar invested and by setting objectives for the departments which work for the greatest state growth and wealth rather than for narrow objectives of department protection and fat budgets.

Public apathy too often allows the development of special privilege on the part of strong but misguided interests and on the other hand the "Big Brother" complex in state organization which "browbeats" the small owner and withholds information on budgets and programs.

Too often we allow the official to hide behind the terms "general public" and "public interest" instead of demanding factual information on needs and costs for the organizations' welfare as well as our own.

We allow the cutting of needed funds from state department budgets in order to reduce taxes and assessments without listening to the need to raise salaries in order to secure competent officials to make possible a high order of organizational performance.

Within state organizations one can occasionally hear unsupported and slurring remarks cast at industry people by senior officials in the presence of trainees, and some industrial foresters in their turn belittle the public employee as a "parasite" and "feeder at the public trough."

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Our state forestry organizations are what we make them, and industry in a forested state may well prosper or stagger because of the quality of the state forest laws and regulations and their enforcement.

Now is the time for professional foresters to insist on a critical but supporting partnership between state and industry for the mutual advantage of both partners.

G. H. SCHROEDER
Portland, Ore.

Forestry News

A GROUP of members of the Pennsylvania Forestry Association, on the occasion of its 75th anniversary on June 13, assembled in McVeytown, Pa., at the monument honoring Joseph T. Rothrock, founder of the Association and father of forestry in Pennsylvania. Dr. Rothrock was born in McVeytown in 1839.

The report titled "Southern Pulpwood Production, 1960" was prepared by the U. S. Forest Service in cooperation with the Southern Pulpwood Conservation Association, Atlanta, Ga.

Helicopter Logging

The Sikorsky S-64 helicopter, a $1,750,000 twin turbine carrier originally designed as a tactical military craft, is due to get its first test as a log-hauler early next year in Oregon. The first S-64 is scheduled to be completed this winter.

The S-64 will have a payload capacity of over eight tons and be capable of hoisting a load at a hovering height of 200 feet. Still undetermined, however, is the question of economical operation.

Southern Pulpwood Sets Record in 1960

More than 23½ million cords of pulpwood—an all-time high—were cut in the South during 1960, according to a recent report of the U. S. Forest Service. The harvest, which was 4 percent greater than in 1959, supplied 57 percent of all wood used by the nation's pulpmills during the year.

Pulping capacity in the South continues to rise. It increased from 46 thousand tons of pulp per day in 1959 to more than 50 thousand tons last year. Six new mills are in prospect.

Georgia was again the South's leading producer, harvesting 4.9 million cords. Alabama cut 3 million cords, and North Carolina, South Carolina, and Florida each cut more than 2 million.

More than 12 percent of the wood is delivered to the mills in the form of chips, mainly supplied by other wood-using plants. At least 896 sawmills, veneer mills, and other forest industries are currently equipped with chip-making machinery.

Southern pine continues to be the most important wood in the nation's pulp industry. It accounted for about half of all wood consumed by U. S. pulpmills in 1960.

The use of southern hardwoods for pulp is steadily rising. The 1960 hardwood harvest, 4 million cords, set a new record for the tenth consecutive year.

Pine bolts were cut in 775 of the 927 southern counties in 1960, hardwood cordage in 723 counties.

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Association Magazine Receives Award

Forests & People, the official magazine of the Louisiana Forestry Association, received one of the top awards given by the International Council of Industrial Editors.

The magazine, a quarterly publication edited by Ed. Kerr of Alexandria, was judged second in the nation among more than 650 industrial and association periodicals.

"The forestry association should be commended for this unusual publication," the judges commented. "It is a tremendous success at bringing people into the subject and the subject to the people."

New Symbol for National Forests

Five loops in the shape of a tree form the central element of a new symbol for the national forests.

The U. S. Department of Agriculture says the five loops signify the five resources of the national forests—water, wood, wildlife, forage, and recreation. A continuous line connecting them symbolizes the interdependence and interrelationship of the five resources. The symbol, Forest Service officials said, is a means of explaining the management principles applied on the national forests as directed by Congress under the Multiple Use Act of June 1960.

The design is based on an ancient symbol for wood. The original symbol had three circles on top of a tree trunk. Forest Service has modified the circles into five connected loops to form a multiple-use tree.

This symbol is the first one especially designed for the national forests. It does not replace the pine tree shield, traditional emblem of the Forest Service as a public agency.

California Leases 4,000 Acres of Public Lands

California has leased 4,000 acres of public lands along the lower Colorado River from the Department of the Interior. The property will be managed by the California Department of Natural Resources for recreational development as a state park.

According to Interior Secretary Udall, the lease "is one of the first major steps to be taken to implement the Department's program for utilization of public lands along the Colorado River" in southern California.

The lands currently are being administered for reclamation purposes. Part of the acreage is in a National Wildlife Refuge. It will continue to be used for that purpose.

Denver Library to Collect Conservation Literature

The first national center containing lore and learning of conservation has been established at Denver, Colo.

Official action by the Denver Library Commission created a special collection in Denver's new, modern library for manuscripts, reports, diaries, correspondence, photographs and books dealing with conservation history, policies, practices, and programs.

This action followed a three-year search by conservationist and author Arthur H. Carhart who wished to assign his library to a central depository specializing in this field. No such place was found.

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servation existed," stated John T. Eastlick, Denver City librarian. "A gigantic demand for training more scientists has centered on physics, chemistry, and nuclear fission. Vital as these fields are, it is just as imperative that we develop the best possible leadership to guard the productivity of our soils, of our waters and forests, fields, meadows and grasslands, which underwrite life itself."

In this Conservation Center, according to Eastlick, conservation leaders of tomorrow will be able to review, in this one location, the records of campaigns that resulted in national forests, national parks, soil conservation programs, wildlife protection and management, and many related subjects.

More than 50 national conservation leaders have endorsed the Conservation Center as a vital need. Between 30 and 40 significant collections of conservation materials have been promised to this Center though it has only now been announced.

Private & Industrial

Heacox Appointed to Advisory Committee

Edwin F. Heacox, vice president of Weyerhaeuser Company's timberland division, has been named to the 11-member National Agricultural Research Advisory Committee.

Appointment of Heacox to a three-year term on the committee was made by Secretary of Agriculture Orville Freeman.

Members of the Committee serve as advisers to the Department of Agriculture in the field of research in forestry, farming, agricultural marketing, utilization, economics, and home economics.

Heacox joined Weyerhaeuser in 1930 following his graduation in forestry from Iowa State College.

IFA to Start Second Nursery

"After 20 years of growing trees for private reforestation at our non-profit Greeley Forest Nursery, Nisqually, Wash., demand has outrun our capacity, so we are doubling it by starting a second nursery in Oregon," C. W. Richen, president of the Industrial Forestry Association, has announced.

Members of IFA operate 319 forest products plants in western Oregon and Washington's Douglas-fir region, own and manage more than 7 million acres of forests, mostly in certified tree farms, and employ 67,000 persons with a $350 million annual payroll. "To go the extra mile to provide a permanent timber supply for steady employment and stable communities, IFA started the Greeley Nursery in 1941 to grow trees for private lands. It has grown 121 million seedlings, two-thirds of them in the last decade," Richen said.

The second IFA nursery will be developed on 55 acres near Canby in Clackamas County. It is planned to grow 10 million trees a year with the first crop to be sown in 1962, Richen said.

W. D. Hagenstein, IFA manager, announced that IFA forester N. E. Bjorklund will be in charge of developing the new nursery assisted by Rex Eide, Greeley Nursery superintendent. Tree growing contracts for the new nursery are now being solicited.

AFPI Names William West Washington Editor

William O. West, former writer with the U. S. Department of Agriculture, has been appointed editor for American Forest Products Industries.

The appointment was announced by C. A. Gillett, managing director of AFPI.

West succeeds Ward C. Williams, now editor of *Pulp and Paper International* magazine in Zurich, Switzerland.

West has had 15 years of profes-

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This new book presents a practical approach to teaching the forestry aspects of entomology to students who intend to become professional foresters. Background in insect structure, development and behavior is presented for ready recognition and evaluation by the practicing forester. Keys are illustrated in this reference for office, laboratory and field. 1961; 5½ x 8½"; 230 pages; $4.50

LABORATORY EXERCISES IN FOREST ENTOMOLOGY
T. O. Thatcher, Colorado State University
Exercises in this manual are specifically designed to accompany the author's book, *Forest Entomology*. 1961; 8½ x 11"; 42 pages; $1.65

ILLUSTRATED GENERA OF WOOD DECAY FUNGI
Charles L. Fergus, Pennsylvania State University
This comprehensive manual will help the general forester identify wood decay fungi so he can determine the extent of damage, and will provide an illustrated key for use in a forest pathology laboratory. 1960; 8½ x 11"; 135 pages; 108 photos; $4.00

WORKBOOK FOR WOODY PLANTS
James W. Hardin, North Carolina State College
Morphology of woody plants, the relationships of families and genera, and identification are emphasized in this workbook. It is adaptable for courses in dendrology or trees and shrubs. 1960; 8½ x 11"; 134 pages; illustrated; $3.50

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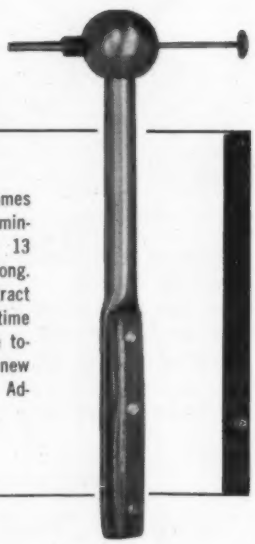

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sional experience in all phases of publishing. At one time he was chief editor for the Corps of Engineers training literature; later he was group editor for Westinghouse Electric Corporation.

Before taking an assignment with the Department of Agriculture, he was for six years editor and publisher of a monthly publication in the electronics field.

Orell Renamed FHS President

Bernard L. Orell of Tacoma, Wash., has been re-elected president of the Forest History Society. Mr. Orell is vice president of the Weyerhaeuser Company.

Re-elected to a second term as vice president of the Society was Dr. Paul H. Giddens, president of Hamline University of St. Paul, Minn.

The Society also re-elected Elwood R. Maunder its executive director. Maunder has headed the Society since 1952.

Other officers named at the annual meeting of corporate members of the Society are: Clarence G. Frame, treasurer; Charles J. McGough, assistant treasurer; and Mrs. Peggy Fastner, assistant secretary.

G. L. Lowry Joins Research Institute

Gerald L. Lowry joined the staff of the Pulp and Paper Research Institute of Canada on July 1 as forester (Forest Soils) in the Woodlands Research Department.

Since 1955 he has been with the Ohio Agricultural Experiment Station in charge of stripmine reclamation research involving tree establishment investigations and basic studies in tree nutrition, rock weathering, and soils. A native of Pennsylvania, he holds a forestry degree from the Pennsylvania State University (B.S. 1953), a soil science degree from Oregon State University (M.S. 1955), and a forestry degree from Michigan State University (Ph.D. 1961).

CZ Keeps Planting

Crown Zellerbach Corporation's reforestation activities hit an all-time high during the 1961 planting season with 10,172 acres of the company's Oregon and Washington tree farms restocked by hand planting and aerial seeding.

G. H. Schroeder, the company's chief forester, said tree planters hand planted 2,758,700 two- and three-year-old seedlings on 6,445 acres. Helicopters seeded 3,525 acres and hand seeding accounted for 202 acres. Species used included Douglas-fir, Sitka spruce, grand fir, silver fir, noble fir, Monterey pine, and ponderosa pine.

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RECENTLY initiated into Phi Chapter of Xi Sigma Pi, were fourteen Montana State University Forestry School students, Seated, *left to right*, are: Richard Barney, Edmond Packee, George Bernhard, Tony Carlson, Ralph Conrad, and Robert Murray. Standing: Laurence Magone, Glenn Peterson, Robert Burgan, Charles Butts, Robert Bosworth, Robert Wiseman, John Chambers, and Richard Birgenheier.

An estimated 21 million seedlings have been planted on Crown Zellerbach lands in a reforestation program which had its beginning 36 years ago. These bring to 80,970 the total number of acres restored by planting and seeding to forest growth on the company's northwest tree farms.

The company pioneered the use of helicopters for reforestation purposes in 1947 when the first commercial application of tree seed by helicopters was made on the E. P. Stamm Tree Farm near Vernonia, Ore.

Schools

Scientists and Educators Urge Strong Science and Math for Elementary and Junior High Schools in AAAS Report

Science education beginning in kindergarten has been proposed as part of a major program to effect improvements in science and mathematics instruction in all grades through junior high school.

A report of a study undertaken by the American Association for the Advancement of Science also calls for a coordinated 10-year sequence of science as an important thread of a general education "to equip all persons for life in a scientific and technological society."

The study, sponsored by the National Science Foundation, sees the need for "a substantial team effort" of scientists and educators to produce high quality materials for a major improvement in elementary and junior high science teaching.

Instruction at the elementary levels would emphasize basic ideas used in science as well as the scientific method itself, particularly in its applicability to general problem solving. Division of instruction into traditional categories of science would be avoided.

The report "Science Teaching in

AWARD WINNER. Kenwood C. Nichols, Selma, Ala., *left*, receives an award for being an outstanding senior in forestry at Auburn University from W. B. DeVall, head, Forestry Department, School of Agriculture. The award, given annually by the Southeastern Section of the Society of American Foresters is a tie clasp and paid membership dues in the Society for one year. This is the second year the award has been given.

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Elementary and Junior High Schools," published by the AAAS in *Science,* is the result of three conferences held independently, and attended by teachers, educators, scientists, psychologists interested in learning theory, and representatives of course-content-improvement programs. NSF sponsored them as part of its growing support of projects to produce modernized and improved course-content materials for science and math on the elementary level, as well as for established projects for secondary education.

CSU Awards Nation's First Doctorate in Watershed Management

Colorado State University recently marked a milestone in forestry education when Peter E. Black received the nation's first Doctor of Philosophy degree in watershed management.

It was the first doctorate earned in the CSU College of Forestry and Range Management as well as the first ever awarded in watershed management.

Black holds B.S. and M.F. degrees in forestry from the University of Michigan and he has had several years experience with the Southeastern Forest Experiment Station at the Coweeta Hydrologic Laboratory in North Carolina. His doctorate program at CSU was directed by Robert E. Dils and Bernard Frank, professors of watershed management, in cooperation with the University's department of economics.

"Timber and Water Resources Management: A Physical and Economic Approach to Multiple Use of Denver's Municipal Watershed" was the title of Black's dissertation. He studied at CSU as a Charles Lathrop Pack Forestry Foundation graduate research assistant and he also held the University's Boettcher Foundation fellowship.

Black has accepted an appointment to the staff at Humboldt State College, Arcata, Calif., where he will teach courses in forest influences and forest and range hydrology, starting next September.

Michigan to Offer Angle-Count Cruising Short Course

The University of Michigan has announced a short course in the angle-count method of sampling forest stands, otherwise known as point-sampling, variable plot cruising, or the Bitterlich method. The course will last for 3½ days during the period September 6-9. It will be held at Camp Filbert Roth, Iron River, Mich., and will be taught by Prof. John Carow. Persons interested should write Prof. Carow at that address. Cost including board and room: $50. Student qualifications: college training in forestry or engineering desirable, but not essential if applicant has cruising experience.

Named to SIU Staff

Maxwell L. McCormack, Jr., candidate for a doctorate in forestry at Duke University, Durham, N. C., will join the Southern Illinois University forestry department faculty in Carbondale September 1 as an instructor.

A native of Atlanta, Ga., McCormack is a graduate of the University of Maine and received a Master of Forestry degree in silvics at Duke in 1959. His field of specialization will be mensuration. Besides holding research assistantships at Duke University, McCormack has been employed in forestry by Rayonier, Inc., at Jessup Ga., and Hoquiam, Wash.

Public

Navy Broadens Land Resources Program

ROBERT CURTIS

The Navy will develop and direct a forest management program for the timber land at Naval activities to strengthen its present natural resources program.

Selected to direct the forestry program is Robert Curtis who has been

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special assistant for the District Public Works Office, Fourth Naval District. He will be a forestry consultant for the Natural Resources Branch headed by Comdr. C. F. Zirsow, CEC, USN, at the Bureau of Yards and Docks. The Navy's management of resources on the lands and properties held by the service was transferred to BuDocks last year. The Bureau previously had responsibility for soil conservation and erosion control.

Curtis will be the principal technical authority for the Navy on all matters pertaining to forest management. He also will serve as technical adviser on the selection and management of vegetative covers for soil and water conservation on Navy lands. He began his work with the Bureau in July.

As special assistant in the Fourth Naval District the last four years, Curtis developed and implemented a districtwide program for the conservation of natural resources at Naval installations in Ohio, Pennsylvania, Delaware, and New Jersey. The new BuDocks consultant served with the Navy as a commissioned officer during World War II in Guam, Okinawa, Saipan, Tinian, the Philippines, and Japan.

LOUIS C. HERMEL

Curtis received his degree in forestry from Iowa State University in 1935. Since graduation he has supervised forestry work for the U. S. Forest Service, the U. S. Soil Conservation Service, and the University of Missouri. He also has served as an area conservationist and plant materials specialist and has been an active member of the Society of American Foresters.

Because of the requirements of its defense mission, the Navy Department has control and jurisdiction over land areas which are best suited for or which contain timber resources. Until this year, it has not been possible to fully pursue a management program because of the scarcity of defense appropriations for this purpose. The Defense Appropriations Act of 1961, however, provides for the reimbursement of the expenses of forest management from the proceeds of the sale of timber which will permit an adequate management program. In announcing its program, the Navy stated: "It is the continuing policy of the Secretary of the Navy that all Navy and Marine Corps installations and facilities having suitable land and water areas shall have active, progressive programs for the management and conservation of renewable natural resources in the public as well as the military interest. Timber is one of America's most important renewable natural resources and therefore our forest lands shall be intensively managed for restoration and improvement until each forested area has been developed to the point where planned care and harvest will sustain all forested areas at their maximum level of timber quality and productivity. In carrying out this policy, the ecological interdependence of all renewable natural resources must be kept in mind and the management of our forests must be integrated with the management of our soils, waters, grasslands, and fish and wildlife."

USFS Announces North Central Region Promotions

Regional Forester M. M. Nelson has announced several personnel changes for the North Central Region of the U. S. Forest Service.

A new post of deputy regional forester has been established, which Mr. Nelson reports is one of two such positions that have been approved by the Secretary of Agriculture. (The other is in the Pacific Northwest Region.) The expanding workload due to mounting pressures for greater use of the national forests was cited as the reason for the new position. The existing organizational pattern which provides for an assistant regional forester in charge of each of the major fields of activity will be continued. Named as deputy regional forester was Louis C. Hermel, formerly assistant regional forester in charge of State and Private Cooperative Programs.

Hermel's replacement is Paul St. Amant, forest supervisor of the Shawnee National Forest in Illinois.

Thurman H. Trosper has been appointed assistant regional forester in charge of Personnel Management. Trosper's prior assignment was chief of the Branch of Multiple Use Relations in the Washington office. He fills the position vacated by the retirement of Chester L. Van Giesen.

Henry W. De Bruin, staff assistant to the supervisor of the Superior National Forest, has been appointed staff assistant to the chief of the Division of Information and Education in the Regional office. He fills the position vacated by the promotion of Paul M. Kihlmire to the Washington office.

Frank Kopecky has been promoted to supervisor of the Shawnee National Forest from the Regional office assignment of staff assistant in the Division of State and Private Forestry.

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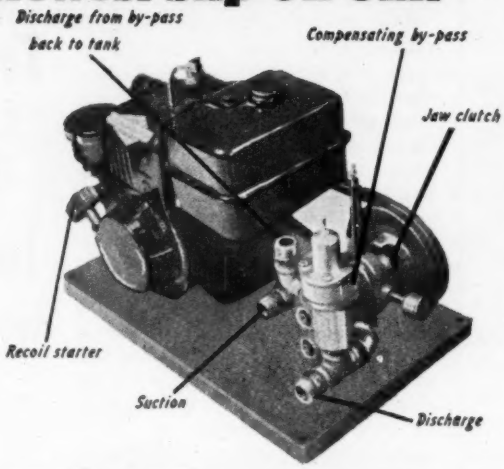

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National Park Service Proposes Camping Rule

Camping in areas of the National Park System will be limited to a stay of not more than 14 days during intensive public-use seasons under new regulations proposed by the National Park Service, the Department of the Interior has announced.

The proposal, National Park Service Director Conrad L. Wirth said, is designed to prevent abuses by campers in instances where they make use of a park camp site as a seasonal residence.

Director Wirth explained that more and more campers make use of the park camp sites every year. Last year some 4,800,000 camp-use nights were tabulated in park campgrounds. All indications are that the 1961 total will surpass that number. Figures to date reveal 257,000 camp-use nights during the first four months of 1961 compared with 236,000 for the same period in 1960.

The proposal is scheduled for publication in the *Federal Register*, and interested persons may submit comments, suggestions, or objections to the proposal by writing to the Director, National Park Service, Washington 25, D. C., within 30 days of the date of publication.

Two Park Service Foresters Transferred

Robert B. Moore, assistant chief of the Branch of Park Forest and Wildlife Protection, National Park Service, is being transfered to Grand Teton National Park, Wyo., as assistant superintendent. Moore began his career in the National Park Service in 1934. He has served successively as park ranger, and assistant chief ranger in the field, and as staff forester in two National Park Service regional offices. He was assigned as a staff forester in the Washington office in 1953.

PAUL M. KIHLMIRE

Richard M. Ward, forester in the Branch of Park Forest and Wildlife Protection, National Park Service, is being transferred to Mammoth Cave National Park, Ky., as chief ranger. Ward began his career in the National Park Service in 1947. He has served successively as park ranger and chief ranger. He was assigned as a staff forester in the Washington office in 1960.

Kihlmire to Head New USFS Branch

The U. S. Forest Service is establishing a new Branch of Visitor Information and Service in its Washington office as part of the Division of Information and Education. Named as branch chief is Paul M. Kihlmire. He goes to his new post from the Division of Information and Education in Milwaukee. Kihlmire will be responsible for the development, policy, and direction of a program for serving the increasing numbers of people who visit the national forests.

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Civil Defense Coordinator for USFS

Roy W. Olson, assistant regional forester in charge of the Division of State and Private Forestry, Eastern Region, U. S. Forest Service, with headquarters at Upper Darby, Pa., has been appointed civil defense coordinator of the Forest Service, Washington, D. C.

Olson is a forestry graduate of Iowa State University. Employed in private industry after graduation in 1929, he entered government service in 1933 as supervisor of a CCC camp on the Nicolet National Forest in Wisconsin. For the next 17 years, Olson worked in the North-Central Region of the Forest Service in positions of increasing responsibilities and was appointed supervisor of the Shawnee National Forest in Illinois, where he served from 1944-1950.

ROY W. OLSON

Transferred to Portland, Ore., in 1951, he served as assistant to the chief of operations of the Pacific Northwest Region for one year and was then appointed to his present position of assistant regional forester of the Eastern Region.

Mr. Olson was recently honored as recipient of a Certificate of Merit by the U. S. Department of Agriculture for "sustained high-level performance in directing cooperative forestry programs in the 14 States of the Eastern Region."

Two Portland Foresters to Washington Office

Charles A. Rindt of the USFS Pacific Northwest Regional office and Edward H. Clarke of the Forest and Range Experiment Station, both of Portland, Ore., have been promoted to

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positions in the Washington, D. C., office of the Service.

Rindt is scheduled to head up a national program dealing with reforestation, cutting practices, and timber stand improvement.

Clarke, a research specialist in wood utilization, will assist in a Forest Service project to provide more accurate log and tree grades, among other utilization research duties.

Va. Education Chief Accepts Audubon Post

Joseph J. Shomon, chief of the education division of the Virginia Commission of Game and Inland Fisheries and editor of *Virginia Wildlife* magazine for nearly 15 years, has resigned his state post to accept the directorship of the newly-created Nature Centers Division of the National Audubon Society in New York City.

Named to succeed Shomon as commission education chief and *Wildlife* editor was M. Rupert Cutler, information officer with the game agency since 1958.

Shomon, who joined the Virginia game commission in July 1947 after obtaining Bachelor and Master degrees in forestry and wildlife management from the University of Michigan, serving with the Army in World War II and working as educational forester with the Tennessee Valley Authority, obtained his Ph.D. while on leave of absence at the University of Michigan in 1959.

Smith and Rogers Promotions Announced

John B. Smith, supervisor of the Wallowa-Whitman National Forests, has been promoted to the Washington, D. C., headquarters of the U. S. Forest Service where he will be staff specialist in the Division of Fire Control.

A 1939 graduate of Oregon State University, Smith was from 1939 to 1943 fire control officer and timber management assistant on the Umpqua National Forest.

He served in varying capacities of increased responsibility before becoming forest supervisor in 1958.

Succeeding Smith as supervisor of the Wallowa-Whitman National Forests will be John L. Rogers.

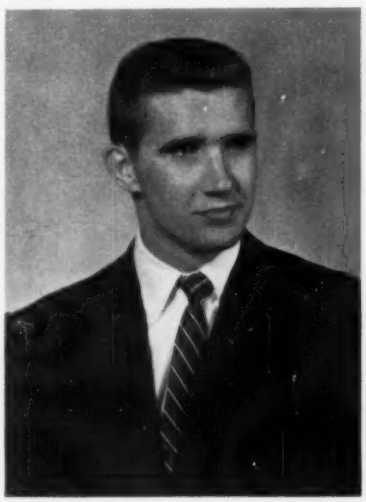
Rogers is a 1943 graduate of Colorado State Univ. and holds a Master degree from the same school. He did work in several regions of the Forest Service in 1941, 1942, 1946, and 1947. He served as research assistant at the University of Arkansas Experiment Station in 1947-1948 following Army service in World War II. He worked on two national forests in Montana and in the Region I office at Missoula from 1948 to 1959, when he transferred to the Ochoco Forest as staff officer in charge of range, wildlife, and watershed management.

Pennsylvania Extension Forester

Charles H. Strauss, with the California Redwood Association for the past year, has been named an extension forester at the Pennsylvania State University where he was graduated with a Bachelor of Science degree in forestry in 1958.

A year ago he received the Master of Science degree in forest products at Michigan State University.

Dr. H. R. Albrecht, extension director, said Strauss' appointment, effective July 1, fills a vacancy on the extension forestry staff.



CHARLES H. STRAUSS

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

State agricultural experiment station has challenging opening for research man to direct forest soils investigations. New laboratory with excellent equipment. Considerable latitude for independent research and individual initiative. Ph.D. required. Request application form from **Chairman, Department of Forestry, Ohio Agricutural Experiment Station, Wooster, Ohio.**

Positions Wanted

Forester, B.S. Forest management, University of Michigan, 1948. M.F. Forest management and logging engineering, Oregon State, 1954. Twelve years research and applied experience, state and private, in stand regeneration, thinning, reforestation surveys, brush eradication, timber appraisals, operated nursery producing 300M seedlings. Desire resource management position with future, either research or applied or teaching position. Prefer western U.S., consider all locations.
Box I, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forestry B.S., University of Georgia 1959. Age 27, married, one child, veteran. Experience: Timber sales, TSI, surveying, pulp & paper company. Desires position with smaller lumber or logging industry in management or in timber sales, with emphasis on logging. Prefer southern location.
Box K, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, professional. Seeking private industry involving hardwood management. Five years government research in Appalachians covering investigations in practical applications of management techniques and silvicultural systems; including marking, road layout, site determinations, quality estimates of standing timber. Sawmill and lumgeryard experience plus two years as N.H.L.A. approved lumber inspector. Veteran, 33, family.
Box L, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

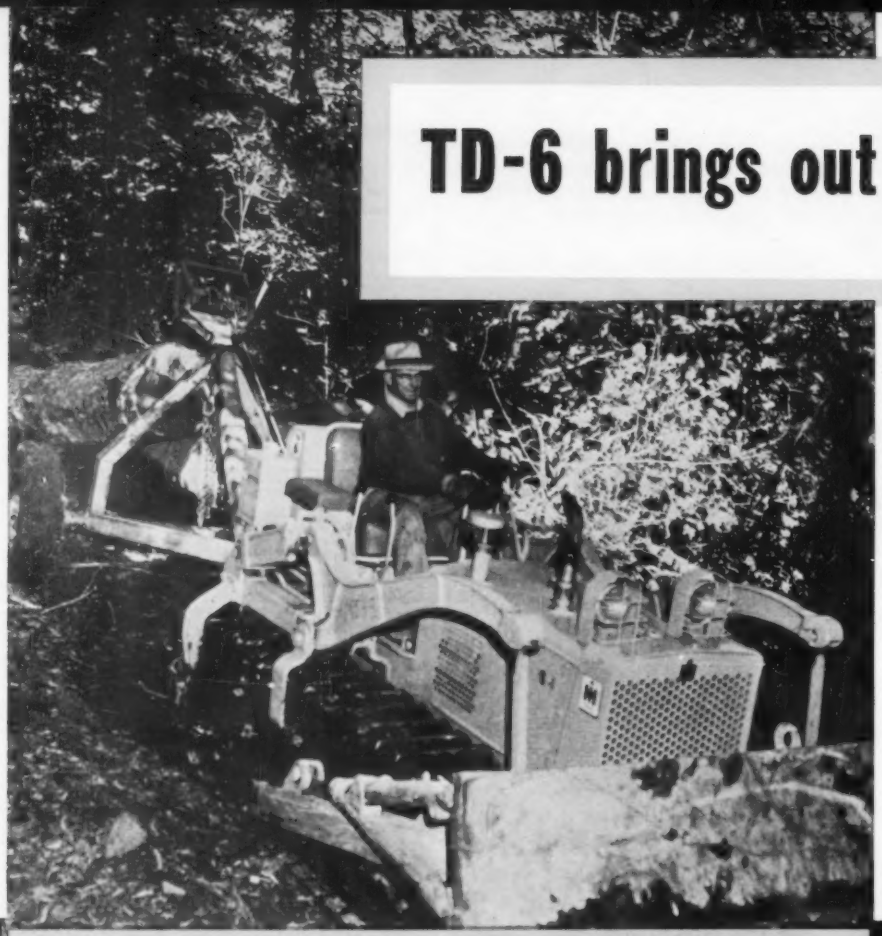
Management Forester: B.S. Antioch; M.F. Yale. Age 30, single. Seven years experince: Private consulting, Vermont; woodland administration and college teaching, Kentucky; state research, New Hampshire. Sound background in timber inventory, property development, land surveying and related cartography. Desire demanding continental or foreign assignment with progressive forestry or land development organization.
Box M, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, B.S.F. 1956. Age 29, married. Five years experience as service forester for state organization. Includes human relations, writing, speaking, management plan prescription, timber sales administration, marketing assistance, and many other phases of forestry. Desire employment in public or private forestry in West.
Box N, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester B.S. Minn. Age 60. Experience in Federal, State, County Extension, private forestry and lumber merchandising. Qualified for management, marketing, products, education and training.
Box O, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, B.F., Stephen F. Austin College, 1956. Age 27, married, two children; military service completed. Experience: 4 years private company. Included timberland appraisal, management plans, administration, public relations, fire protection, and supervision of planting operations. Desire management position correlated with procurement and public relations, with company in the South.
Box P, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

TD-6 brings out 700-800 bf



Bardill Land & Lumber Company operates 24,000 acres of hard and softwood timberlands in Vermont, on a sustained yield tree farm basis. This 55-hp TD-6 is used for carting in logs from mountain terrain, builds haul roads, and opens up skid trails.

Winch-equipped to "reach-out" and log terrain too steep to tread over, the Bardill Company's TD-6 gets valuable first-growth timber other rigs couldn't get!

loads...logging steep mountain slopes

—for Bardill Land & Lumber Co., Wolcott, Vermont

From "pockets" on steep mountain slopes that "stumped" logging crews a generation ago, this International TD-6 crawler does a businesslike job of bringing out valuable, first-growth timber.

From the real steep pitches, the "6" winches logs to the haul road. When a load is bunched, the "6" carts 700-800 bf at a time to the truck loading ramp. Owner is Bardill Land & Lumber Co., Wolcott, Vt.

"Our 6-cylinder International TD-6 brings out 150-200 board feet more per load than our former 4-cylinder machine," states manager Justus Wheeler. "In addition, we save 18-20 minutes in faster return from loading dock to woods for another load.

"Here, rough terrain, ledges, and streams restrict us, and we find this TD-6 an ideal size machine as it is more stable and has better work speeds."

Built for rough woods work

For smooth, high-torque, grade-beating work power, the TD-6 has the wallop of the direct-start 6-cylinder 55-hp D-282 Diesel. The TD-6 dry-type engine clutch has a full-face sintered metal driven member —to give high power-transfer efficiency and defy heat.

Only the TD-6 gives you the maximum track-to-ground, traction-getting contact—assured by exclusive International 3-point track suspension.

Whether you're logging the roughest, toughest steepest terrain or ordinary woodlands—for pulpwood or sawlogs—see how the 55-hp International TD-6 can deliver you new operating economy; new production profits. Compare TD-6 operating ease and riding comfort to competitive rigs. Let your International Construction Equipment Distributor demonstrate.

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Great New Saws

For top power, fast cutting speed, easy handling — and money-makin' dependability — you'll find that one of the new Homelite 707 chain saws is just right for you! New features include: an extra-husky, drop-forged crankshaft that stands up to the abuse of day-after-day production cutting; new pleated filter, with increased capacity and vertical design, that sheds sawdust and stays cleaner longer; new "on-off" switch grouped with other controls near throttle for easy finger-tip control; new fitted bolts in drive case that provide strong, reliable mounting for bar, regardless of length. Ask your dealer for a free demonstration — one of these new Homelite 707s has everything you need to make more money in production cutting.

NEW 707G — EXTRA LUGGING POWER The new 707G gear drive has the extra stamina you need for real money-makin' day-after-day production cutting. Increased cylinder displacement plus new, heavier crankshaft gives you more power-per-pound . . . more reliability than ever before. Perfectly balanced, the 707G weighs only 21 pounds, less bar and chain. Fells trees up to 7 feet in diameter. Choice of 2.8 or 3.5 to 1 gear ratio. Available with straight blades 16" to 60", brush cutter, 16" plunge-cut bow and clearing bar. Flush-cut or wrap-around handle.

NEW 707D — POWER AND SPEED Increased cylinder displacement and light weight give you more power per pound than ever in the new 707D. Add direct drive speed (ideal for limbing) and you have a quick cutting, easy-to-carry, easy-to-use money maker for pulpwood or saw log cutting. Only 19 pounds, less bar and chain. Fells trees up to 5 feet in diameter. Available with flush-cut or wrap-around handle, straight blades from 14" to 30" and 16" plunge-cut bow.

New Money-Makin' Accessories: Homelite "Perma-Hard Tip" bars — longest-wearing saw bars ever built . . . interchangeable on gear and direct drive models. Homelite alloy-steel chain — precision-hardened, tough, yet easy to file.

HOMELITE

The Money Makin' Saws

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